

augmented reality as a tool for public art

MAKING A VIRTUAL MONUMENT FOR 10 OCTOBER
2015 BOMB ATTACK VICTIMS IN ANKARA

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Abstract

Our public space is a product of the power relationship between authority and the users of the space. As the holders of dominant power continuously impose their will over the physical and communication space, the users of the space generate countless new ways to reclaim agency. The emergence and spread of networked digital technologies during the last two decades have transformed this power relationship by providing the masses with new media. Using widely available consumer-grade computers and the internet, the users of the public space can create their communication tools and connect with others. This thesis focuses on understanding the role of one particular medium in this digital ecosystem: augmented reality.

This practice-based research studies augmented reality technology as a public art tool to intervene with power relationships in the public space of our network society, through an artwork. The artwork at the centre of the research is a virtual monument at the site of 10 October 2015 Ankara bombings. The artwork aims to harness the abilities of augmented reality technology to achieve freedom of expression in public space. The research evaluates the artwork and augmented reality as a tool for public art, by synthesising the learnings from the creative pro-

duction process, the study of literature and findings from the participant tests. New media researchers, artists who practice similar work or general audience who are interested in the subject can benefit from this thesis.

Keywords augmented reality, public space, public art, mobile ar, monument, activism, new media art, emerging technologies

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Finally, I dedicate this work to 103 people we lost to the 10 October 2015 Ankara twin bombings, and to everyone who is robbed of their right to peace...

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CHAPTER 1

Introduction

Juliana Restrepo's field of view is interrupted by a call from her Jobmonkey Inspiration Guru while she was enjoying her game on her bus ride. The guru assigned her to a grocery shopping task, and the notification which appears next to the bus door tells her to get off at the next stop. She walks to the front door, passing through the "get off here" signs, advertisements, a "thank you for choosing public transport" message, and gets off the bus. This busy street of Medellín, Colombia, is not any less kaleidoscopic than the bus. The whole space is overlaid with holographic traffic signs, virtual plants and of course, advertisement. When she finally starts her shopping with the company of a virtual dog on her shopping cart, the whole virtual system starts to stutter; she sees a glance of the naked physical world. A sex-shop ad now replaces her shopping time pet dog. Juliana calls her service provider's support line to report the issue, and finds out her identity is under a cyber attack...

I will stop the story here not to spoil the rest of Keiichi Matsuda's 2016 short movie *HYPER-REALITY*¹ for the readers who did not see it yet. Matsuda says the film shows "a provocative and kaleidoscopic new vision of the future, where physical

¹ <https://vimeo.com/chocobaby/hyper-reality>

and virtual realities have merged, and the city is saturated in media.”² We do not know if our daily lives will look like this in the not-so-distant future. Today—if we put the professional-grade uses of AR aside—augmented reality, commonly known as AR, mostly penetrates the daily life of an end-user in the form of Instagram and Snapchat³ filters or walking directions in Google Maps.⁴ However, the current state of the AR technology, as I talk more about in the third chapter, promises much more than this. It enables us to imagine a future where our physical and virtual realities are amalgamated with one another. This thesis focuses on one of the possible uses of AR: Public space art. More specifically, the primary question of my research is:

How can we harness augmented reality technology as a public art tool to intervene with power relationships in the public space of our network society?

My research is a practice-based one, by which I present a body of knowledge reflecting on my creative production and thinking processes. The central artefact of this research is a site-specific AR artwork: “A Virtual Monument for 10 October 2015 bomb attack victims”. On 10 October 2015, twin suicide bombings at a rally in Ankara, Turkey killed 103 people. The government rejected demands for a monument at the site of the attack and has avoided commemorating the victims. I created a virtual monument for the site of the attack, and I produced a proof of concept iOS application with which the intervention can be experienced, and studied six voluntary participants, experiencing my artwork using this application. Since I aim for exploring the ways an augmented reality public space artwork can reach out to as many people as possible in the near future, I only focus on the mobile hand-held device use case in this research. Other use cases such as head-mounted displays and desktop or laptop applications of AR are out of the scope.

2 Keiichi Matsuda. “Hyper Reality”. Accessed October 2, 2019. <http://hyper-reality.co/>.

3 Jonathan Nafarrete. “Snapchat and Instagram Continue AR Filter Battle.” VRScout, May 16, 2017. <https://vrscout.com/news/snapchat-instagram-ar-filter-battle/>.

4 Etherington, Darrell. “Google Launches ‘Live View’ AR Walking Directions for Google Maps.” TechCrunch. TechCrunch, August 8, 2019. <https://techcrunch.com/2019/08/08/google-launches-live-view-ar-walking-directions-for-google-maps/>.



Figure 1. Participant experiencing the 10 October 2015 AR Monument

In the second chapter, Theoretical Framework, I lay out the theories my thesis engages. First, I introduce the theories of Lefebvre and de Certeau and explain the relationship between their work and public art with the help of Miwon Kwon and Suzanne Lacy's works. Secondly, I introduce Castell's network society theory to demonstrate how augmented reality public art, and my artwork connect to the power relationships in our public space.

The third chapter, Augmented Reality Technology, starts with the definition of AR and provides a brief overlook at the history of this technology. Later, I present the current popular implementation methods to create AR experiences. This part provides information for artists who considering creating an AR experience and will help the audience to understand the method I chose in the development of my application. The chapter continues with a discussion about possible future directions AR technology might take. Finally, I present an overview of the short history of AR art.

I present my creative production process in Chapter Four. I give a detailed description of the design process and the creation of the artwork, including the sto-

ry of selecting the site, some background about the attack, and building the proof of concept application. I finish the chapter with the presentation of the focus group test and the field observation.

The final chapter, Conclusion, starts with the presentation of the focus group test and field observation findings. Following that, I give a retrospective reflection on my research, discuss the learnings and revelations. And I finish the thesis with presenting the ideas about further work.

1.1 The backstory and personal motivation

In the early 2010s, our world and many of the human societies living on it have been going through significant societal, political and economic changes. As a designer in the technology industry, I was naturally very much amazed by witnessing how technology had become one of the most critical change agents.

Techno-optimism was prevailing over the concerns about the possible consequences of the rapid growth of technology—the exact opposite of today’s emotional atmosphere. We were excited to see how the internet connected billions of people around the world, mobile technologies were allowing us to pay our bills on the go, we stopped getting lost thanks to the GPS maps in our pockets, and “changing the world using technology” was not just yet an overused, corny statement. We were aware and concerned about surveillance and any other possible security vulnerabilities that technology might expose us. However, we were just not yet fully aware of how the ascendance of connected networks was changing us.

Back in 2012, I started using my—back then mostly dormant—Twitter account to follow the trials in Turkey. Independent journalists and some lawyers were live-tweeting from the political student and journalist trials. The news on the traditional media was not half as transparent, and we did not have to wait for them to publish the news. Watching the increasing government oppression over individual freedoms was worrying for most of young adults like me. Politics have

become more important for even the previously apolitical members of the society and having alternative information resources, and discussion platforms were fostering this interest among masses.

On the one hand, we were feeling the increasing limitations in our physical space, such as the growing intolerance for protests and any critical expression in our cities. On the other hand, technology was promising new ways to overcome prohibitions. This atmosphere in Turkey ensued over the years, so made the emergent technologies' impact on our lives and societies. These two strong forces consolidated and forged my two existing interests together: urban life and critical use of technology. This interest was even what prompted me to study New Media in the first place.

My initial idea for creating an AR public space art occurred before my Master's studies, in early 2015, when I did not know much about AR or site-specific art. I was not focusing on creating an art project. My objective was to explore the seemingly empowering potential of technology to overcome a problem.

In 2013, people's fight for protecting an urban park in Istanbul had triggered the biggest uprising in the history of modern Turkey. Gezi Park protests gave me the chance to experience the power of the masses in first hand. It also made me feel the weight of the authority's dominance over the city. I noticed that I could only roam the streets and squares as long as the authority permits. I started to explore disobedient urban activist practices, most possibly to reconcile from this new feeling of powerlessness. Among all the great works I found, two particular artworks resonated with me deeply. The first one was Suzanne Lacy's *Three Weeks In May*.



Figure 2. *Three Weeks in May*. Accessed October 2, 2019. <http://www.suzannelacy.com/early-works#/three-weeks-in-may/>.

Lacy and other contributing artists created a series of performances during a three weeks workshop in Los Angeles in 1977. The first artwork in the series was stamping the reported rape cases in the city on a map and marking sidewalks at where the assaults took place.⁵ Her work made me think about the challenges of creating a similar work in Turkey. It was evident to me that the artist of such a work would be in trouble with authorities, even if not, the authorities would remove the artwork immediately.

The other artwork which inspired me was Krzysztof Wodiczko's projection on the South African Embassy at Trafalgar Square in London, in 1985. Wodiczko projected a swastika on the building's front wall "in a gesture of support for demonstrations against South Africa's apartheid policies and the loans offered to Pretoria by the Margaret Thatcher government."⁶ During the two-hour around

5 "Works." SUZANNE LACY. Accessed October 2, 2019. <http://www.suzannelacy.com/early-works#/three-weeks-in-may/>.

6 "Projections." Krzysztof Wodiczko. Accessed October 2, 2019. <https://www.krzysztofwodiczko.com/public-projections#/south-africa-house-projection/>.

projection, around two thousand viewed the intervention. However, many more have seen it afterwards, from the pictures of the event.



Figure 3. Krzysztof Wodiczko, The South African Embassy, Projection. Trafalgar Square, London, 1985. Accessed October 2, 2019. <https://www.krzysztofwodiczko.com/public-projections#/south-africa-house-projection/>.

His work is an exemplary manifestation of the use of technology in public space interventions. When I thought about these two works together, I immediately thought about putting augmented reality into use in order to make the artwork and the artist immune to the authority's interruption.

I did not think further about this idea for a while. However, later, during the following years, as the big cities of the country faced several traumatic incidents and the freedom of voice in Turkey has become a bigger issue, I found myself revisiting the idea more and more often. I found it concerning that any critical expression in public space was deemed impossible; the idea of creating alternative safe public spaces seemed more crucial than ever. I started to find out about similar ideas and those motivated me to explore my idea further.

Before I conclude my introduction, it seems beneficial to add that this thesis does

not intend to propose AR as a replacement for physical public space art. As doing and making creatures, we will keep creating art in our environments, using various mediums and tools we make. All of these tools and mediums will suggest new possibilities and hopefully will convey new ideas. Augmented reality is only one of those tools. Since AR is an emerging technology and is not a fundamental part of our lives yet, we can only speculate on what the future holds. However, we can explore its capabilities in the field of art and freedom of speech at the same time we do so in commerce, science, information technologies and other industries.

CHAPTER 2

Theoretical Framework

The initial idea of my artwork was an outcome of chain reactions as I mentioned earlier in the *Introduction* chapter. First, I was shaken by the realisation of authority's power over the city, which led me to research about the creative ways of reacting to this imbalanced power relationship. Why having a say in the decision making regarding our public spaces seemed so impossible? Why did we lose our public properties to privatisation? Why was it that easy to sweep people away from their neighbourhoods? Why gathering and marching were only possible if we have permission from the mayor? My preconceived acceptance of "the way things are" started to fade away with these questions. Henri Lefebvre's theory of the production of space¹ helped me have a better understanding of how the dominant powers produce our space and how it leaves us, the users of the space, with a limited agency to our spaces. The "space" I refer to is not merely physical, it also includes our social space and our understanding of the space.

Even though the dominant powers heavily determine the space, we, the users of the space, continuously find our ways to intervene with the authority's plan. We behave in complex, unpredictable ways; we disobey, revolt or sometimes unin-

¹ Henri Lefebvre, *The Production of Space*, trans. Donald Nicholson-Smith (Blackwell Publishers Ltd, 1991).

tentionally do not conform to the strategy. Our insurgency, as the examples of my two inspiration, Suzanne Lacy and Krzysztof Wodiczko, or my artwork, also transforms our space. To understand the role of such actions of the oppressed, I will introduce Michel de Certeau's theory of *tactics*.²

My urge for making socially engaged, insurgent art is stemmed from a historical relationship of power and counter-power. Disobedience against the authority is not a new phenomenon; resistance towards the imposed power gave rise to protests, social movements and revolutions in history. Naturally, art is not isolated from this sociological and historical power relationship. The modernist art movements such as Situationists, Dada, Russian Constructivism and socially engaged practices in contemporary art often engaged with political issues like Feminism, Marxism and Identity Politics. In this chapter, I will scope my analysis to the areas my artwork engages, within these broad historical ground. First, I will look at how the relationship between power and counter-power plays out in the production of our public space and then I will analyse socially engaged public art. Laying out these foundational concepts helps us to analyse my artwork as site-specific public art.

Until I started working on my concept, I was preoccupied with the idea of reacting the power imposed by the authority, as an individual. I was focusing on creating local interventions which can become statements or communication devices between the inhabitants of the city. However, it did not take me long to realise that I needed to consider the new disruptive reality of our time, the internet. Being globally connected, not just to people but also to places, brings a whole new perspective to my research. As more and more people become authors of this connected space, the more our communication space changes. This phenomenon reflects on the power relationships in our space also. AR can become a powerful tool for overcoming the censorship and transform the power relationship regarding the freedom of expression in our public spaces because it makes our physical spaces accessible through our virtual networks. I investigate this aspect

2 Michel de Certeau, *The Practice of Everyday Life* (Berkeley: University of California Press, 1984).

of my research through Manuel Castell's theory of network society.³

I will conclude this chapter with a discussion about AR art as a new media practice which brings the networked communication space and physical space together. In this discussion, I look at my artwork and AR public space art in general, through the lens of all the ideas I introduce in the chapter.

2.1 Power relationships of public space & the role of public art in this relationship

In order to have a better understanding of how the power relationship between power and counter-power plays out in the production of our public space, I shall present Lefebvre's spatial theory as a foundational framework. According to Lefebvre, this imbalance is problematic because the dominating power holds the devices to define how we experience the space. The language of power determines the narration around lived and perceived experiences. He identifies this process as the "abstraction of space"⁴ and claims that in abstract spaces, users of the space lose the feeling of involvement and ownership.

“Abstraction wielding awesome reductionistic force vis-a-vis ‘lived’ experience.”⁵

This abstraction Lefebvre defines is the will of the authority imposed upon the society. Its reductionistic force creates a discrepancy between the real and the represented. Ankara witnessed several collective traumas in the near past of the city and the country. However, the marks of these events are almost invisible in

3 Manuel Castells, "Communication, Power and Counter-Power in the Network Society," *International Journal of Communication* 1 (2007): pp. 238-266.

4 Lefebvre 1991.

5 Lefebvre 1991, 52.

our physical and social spaces. Even the temporary reminders of these events, such as memorial gatherings are usually dispersed by the police. Going back to Lefebvre's theory, in spite of the abstraction forced by the dominant powers, no space is purely an abstract space. Our practices, perceptions and experiences contribute to the production of space in one way or another. Lefebvre formulates the ways society produces its space through his spatial triad. The three elements of his formulation, Representational Space, Spatial Practice, Representations of Space, and the ever-changing interrelationships between them produce the space according to his theory.

Representational Space

Lefebvre also refers to this as the "lived space". All the meanings we, inhabitants, attribute to the space, our understanding of the stories and symbols in space form representational space.

Spatial Practice "Perceived Space"

This is our use of space, a combination of all the choices we make while we carry ourselves around the space. Our practising body and sensory experience contribute to the production of space by perceiving.

Representations of space "Conceived space"

Representations of space are comprised of all the elements strategically created by institutionalised professionals such as urban planners, architects and scientists. Maps, models, plans alike are typical examples of these representations. This space embeds the ideology of the dominant power into the produced space.

Lefebvre's formulation presents a binary division of the social actors who produces the space: the power and the user. This binary division may make one assume that these camps are homogenous, although it is not entirely correct. Even though the norm-making powers suppress the peculiarities, they cannot wipe out all that is different. This suppression creates groups, bigger and smaller ones. Stronger and weaker, isolated, alienated or invisible ones. All these groups create

complex and dynamic power relationships within our social space. Lefebvre explains this phenomenon with these words:

The space of this social practice becomes a space that sorts - a space that classifies in the service of a class. The strategy of classification distributes the various social strata and classes (other than the one that exercises hegemony) across the available territory, keeping them separate and prohibiting all contacts - these being replaced by the signs (or images) of contact.⁶

Lefebvre's theory presents a clear picture of the power's massive influence over our architectural and social space. However, his analysis portrays a never-changing, static power relationship. In his narration, the dominated stakeholders of the public space are only passive and in harmony with the order of things determined by the power. Also, he does not share his ideas about what the users do to counter the abstraction. I assume this is why his research is usually referred together with de Certeau's works. Especially de Certeau's famous work, *The Practice of Everyday Life*, complements Lefebvre's theory by presenting a comprehensive theory of the user's contribution to the production of space.

Similar to Lefebvre, de Certeau introduces two conflicting actors of public space. He identifies the "producer" group as the structures of power and distinguishes the "consumers" of the space who are the common people. According to de Certeau, as the structures of power produces the space through "strategies", these dominated groups and individuals develop "tactics" to act against these strategies. Before moving any further, I see a benefit in describing the characteristics of strategies and tactics further as they are fundamental concepts in de Certeau's theory. Michel de Certeau explains "strategies" as the actions of the structures of power that produces institutional spaces. The consumers of these spaces use improvisational actions in order to poach some free space and obtain some agency. He names these improvisational actions as "tactics" and describes them as fragmentary actions that "insinuates itself into the other's place, without taking it

6 Lefebvre 1991, 375.

over in its entirety”.⁷

“Everyday life invents itself by poaching in countless ways on the property of others.”⁸

In his book, Michel de Certeau mainly focuses on the tactical nature of everyday life practices. He suggests that everyday life is rebellious and orderless by nature and it always and unconsciously interferes with the planned production of the space. He implies that no matter how the strategy strictly determines the public space, the consumers’ mere existence will carve out tactical spaces against the plans of the strategy. On the other hand, he also attributes tactical characteristics to some conscious actions such as art, which explains his influence on contemporary art, especially critical site-specific practices.

According to de Certeau’s theory, we can interpret critical and insurgent art practices as tactical practices. His framework was acknowledged and adopted by many artists, including a group in the New Media scene. David Garcia and Geert Lovink make the definition of Tactical Media in their 1997 manifesto titled *The ABC of Tactical Media*:

Tactical Media are what happens when the cheap ‘do it yourself’ media, made possible by the revolution in consumer electronics and expanded forms of distribution (from public access cable to the internet) are exploited by groups and individuals who feel aggrieved by or excluded from the wider culture. Tactical media do not just report events, as they are never impartial they always participate and it is this that more than anything

⁷ de Certeau 1984, xix.

⁸ de Certeau 1984, xii.

*separates them from mainstream media.*⁹

Initially, understanding the tactical creativity and its role in the system felt disempowering. After all, if us tactical practitioners are only poaching areas in someone else's territory, could we push the structures of power for changing their strategies? However, as I continued thinking further, I noticed that I was considering the dominant power's strategy as the sole reality and the practices of rebellious users' only as "attempts" whereas tactical practices are part of the system. Once a strategy is disturbed by these disorderly actions, it is no longer as planned. Just because the tactics do not change the dominant strategy, it does not mean that they are irrelevant. In other words, tactical practices alter the game of the structures of power.

Looking at the contemporary art field through the lens of Lefebvre's theory of the production of space and de Certeau's structure and tactics dichotomy, socially engaged site-specific art should be our next stop. I want to start with a brief introduction to the history of site-specific art to see how contemporary art had gotten out of museums and galleries before the site-specific art took the shape of the "new genre public art" as named by Suzanne Lacy.¹⁰

Miwon Kwon, in her 2002 book *One Place after Another: Site-Specific Art and Locational Identity*, mentions the late 60s and early 70s as the emergence times of site-specific art.¹¹ The early site-specific works from that era mainly prioritised the relationship between the artwork and its site, as the cartesian physical space. Kwon presents Robert Barry's wire installations and Richard Serra's *Tilted Arc* as pioneering examples and highlights artists' statements on how their works were created explicitly for their location, and they could not retain their meaning if they are moved and exhibited elsewhere. For instance, Richard Serra, in his 1989

9 David Garcia and Geert Lovink, "The ABC of Tactical Media," *The ABC of Tactical Media*, accessed October 2, 2019, <https://www.nettime.org/Lists-Archives/nettime-l-9705/msg00096.html>.

10 Suzanne Lacy, *Mapping the Terrain: New Genre Public Art* (Seattle: Bay Press, 1996), 25.

11 Miwon Kwon, *One Place after Another: Site-Specific Art and Locational Identity* (Cambridge, MA: MIT Press, 2004).

interview, makes this description of site-specific art which puts a bold emphasis on the architectural relationship between the artwork and its site: Site-specific works deal with the environmental components of given places. The scale, size, and location of site-specific works are determined by the topography of the site, whether it be urban or landscape or architectural enclosure. The works become part of the site and restructure both conceptually and perceptually the organisation of the site.

Kwon argues that this early form of site-specific art was “informed by the contextual thinking of minimalism”¹² and was an institutional critique of the “innocent”, “objective”, “neutral” exhibition space (museums and galleries). They criticise the modernist approach, which presumes a universal viewing subject and artworks that are placeless and autonomous. Although this approach played an essential role in taking art outside of the museum building, it falls short for being too limited in its focus. These artists criticised the physical confinement of the artworks, however, remained silent about the cultural exclusivity of the art world. Their site-specific art was still institutionalised and uninterested with its cultural surroundings even when created for the public space. Kwon criticises Serra’s statements from the 1989 interview with these words:

Serra’s statement, spoken twenty years later within the context of public art, is an indignant defense, signaling a crisis point for site specificity—at least for a version that would prioritize the physical inseparability between a work and its site of installation.¹³

Concurrent to this purely physical approach to site-specific art, some artists were creating more unconventional works that Kwon considers as critiques of the institutional frame. Kwon identifies the essential characteristics of this approach as the move toward “de-aestheticisation (that is, withdrawal of visual pleasure) and dematerialisation of the artwork”. She further explains:

12 Kwon 2004, 13.

13 Kwon 2004, 13.

Going against the grain of institutional habits and desires, and continuing to resist the commodification of art in/for the marketplace, site-specific art adopts strategies that are either aggressively anti-visual—informational, textual, expository, didactic—or immaterial altogether— gestures, events, or performances bracketed by temporal boundaries.¹⁴

Kwon exemplifies this approach with Mierle Laderman Ukele's 1973 series of "maintenance art" performances in which the artist washes the entire museum as a commentary on gender and labour politics.¹⁵

Today's site-oriented art practices, differently from the two approaches mentioned above, prioritise the social engagement over art historical and aesthetic concerns. Kwon argues that it is instead "concerned to integrate art more directly into the realm of the social".¹⁶ Artist Suzanne Lacy names this new movement "new genre public art" and lays out the fundamental characteristics and principles of this new genre in her essay in the 1995 book edited by her; *Mapping the Terrain: New Genre Public Art*. The very first paragraph of her essay describes the "new genre public art" as follows:

For the past three or so decades visual artists of varying backgrounds and perspectives have been working in a manner that resembles political and social activity but is distinguished by its aesthetic sensibility. Dealing with some of the most profound issues of our time—toxic waste, race relations, homelessness, ageing, gang warfare, and cultural identity—a group of visual artists has developed distinct models for an art whose public strategies of engagement are an important part of its aesthetic language. The source of these artworks' structure is not exclusively visual or political information, but rather an internal necessity perceived by the artist in collaboration with his or her audience.¹⁷

14 Kwon 2004, 24.

15 Kwon 2004, 19.

16 Kwon 2004, 24.

17 Lacy 1996, 19.

Lacy states that she proposes the name “new genre public art” in order to distinguish the works that fall under this category from other kinds of works referred as public art such as sculpture and installations situated in public spaces.¹⁸ While she draws a line between the new genre public art and the rest of the history of public art, she finds connections to vanguard forms of art movements in the late 50s and political movements with its emphasis on audience, social strategy and effectiveness. According to her, new genre public art is “art in the public interest” not art in public spaces.

Although Lacy introduces this category as a new genre, Kwon notes that some art critics, including Mary Jane Jacob and Eleanor Heartney, do not agree that it is a new movement or a new aesthetic style. They argue that this politically motivated, pragmatic approach was institutionally disregarded for a long time and gained recognition in the early 90s.¹⁹ I agree with Kwon’s opinion on this, either way, the category Lacy names new genre public art demonstrates a notable change in the field, and its predominance encourages reconsideration of the conventional methods and ideas.

2.2 Network society & networked public art

While the concepts presented by Lefebvre and de Certeau has been essential for my thesis, it seems necessary to point out the rapid change our society has been going through since both these works were published. When Lefebvre published *The Production of Space* in 1974 or when Michel de Certeau published *The Practice of Everyday Life* six years later in 1980, our world was not yet connected through the network today we call the “Internet”. As the way we communicate changed, the formation of our social space also changed, which caused a transformation in the power relationships.

In his 2007 article *Communication, Power and Counter-power in the Network Society*, Manuel Castells writes: “the media have become the social space where

¹⁸ Lacy 1996, 19.

¹⁹ Kwon 2004, 107-108.

power is decided”.²⁰ As he remarks, our media is becoming more social, interactive and provides us with horizontal networks of communication. He names this new way of communication “mass self-communication”, a new alternative to one-directional mass communication. The name implies that the new communication tools are used by many to reach out to many and are not entirely in the hands of the power-imposing minority like the one-directional mass communication tools usually are.

Castells remarks in his article that the emergence of mass self-communication and the spread of technological tools empowered artists, activists and even ordinary people to become media authors and publishers. He anticipates this trend to be the most significant disruption of the new media culture. He argues that this newfound power dramatically transforms the power relationship between the dominant and the consumer. This transformation requires revisiting and updating the former theories of power relationships in public space, illustrated in both Lefebvre’s and de Certeau’s works. We do not certainly know how our social space will look like in the following decades, but we know for sure that we are shaping that future with our practices and actions today. That is not to say that our public space today is entirely different than what it was before the internet era. Furthermore, the new communication tools are not the only factor which shapes our public space; they are in constant interrelationship with all the other building block of our public space. Zeynep Tüfekçi illustrates the role of digital technologies in the formation of our communication space in her book *Twitter and Tear Gas: the Power and Fragility of Networked Protest*:

...as digital technology has rapidly become less expensive, it has just as rapidly spread rapidly to poorer groups. It is the new town square, the water cooler, the village well, and the urban coffeehouse, but also much more. This isn’t because people leave behind race, gender, and social class online, and this isn’t because the online sphere is one only of reason and ideas, with no impact from the physical world. Quite the opposite, such dimensions of the human experience are reproduced and play a significant role

20 Castells 2007.

*in the networked public sphere as well. The difference is the reconfigured logic of how and where we can interact; with whom; and at what scale and visibility.*²¹

In light of all these ideas, I would like to discuss the implications of the subject of this thesis, my Augmented Reality artwork and maybe Augmented Reality public art in general. Tüfekçi's statement about the convergence of the online sphere and physical world is even more evident in the case of AR. A site-specific AR experience, connected to a globally locative network is in direct relationship with the physical space it is created for, and it has the potential to leverage the real-time global connectivity. During the Occupy Wall Street protests in 2011, artist Mark Skwarek organised an AR activist protest at Wall Street called #arOCCUPYWALLSTREET. Twenty-five artists from around the world participated in the protest with over 400 artwork.²² New York Police Department closed Wall Street to traffic, but with Mark Skwarek's AR intervention, the artists around the world and the people around the Wall Street area joined a protest together (see *Figure 4*).

My artwork, 10 Ekim Monument, shares a similar aspect with Mark Skwarek's intervention. I created the virtual monument in Helsinki, approximately 2300km far from the site. Just like the artists who remotely participated the Occupy Wall Street protests with their artwork, my artwork represents me in the monument's site and it becomes the medium for communication between the participants at the site and me, also within them. My work too, intervenes in the prohibited zone of the power, utilising AR technology. I argue that my work and the other works of this kind has the potential to bolster the counter-power as a social actor of the production of space. The locative and connected aspects of this technology enable its users to bring the power of the networked communication space to our physical spaces and alter our sense of place.

21 Tufekci, Zeynep. *Twitter and Tear Gas: the Power and Fragility of Networked Protest* (New Haven, CT: Yale University Press, 2017), 11.

22 Geroimenko, Vladimir. *Augmented Reality Art: from an Emerging Technology to a Novel Creative Medium* (Cham: Springer, 2014), 14.



Figure 4. #arOCCUPYWALLSTREET, Global AR protest in front of the NYSE, (2011) Screenshot (Geroimenko 2014, fig 1.10)

I want to emphasise once again that I do not consider AR technology and activist AR artworks as a silver bullet tool for reclaiming the power of our public space. Technology does alter the power relationships, and it does change the ways we communicate, resist or express ourselves. However, just like any other tool created and used by humans, we shape technology by our use as much as they shape us and our cultures. Zeynep Tüfekçi mentions this essential point as a criticism of the simplistic approach to the impact of social media over the Arab Spring movement:

Activists used these technologies in sundry notable ways: organizing, breaking censorship, publicizing, and coordinating. Older technologies would not have afforded them the same options and would likely have caused their movements to have different trajectories. Technology influences and structures possible outcomes of human action, but it does so in com-

*plex ways and never as a single, omnipotent actor—neither is it weak, nor totally subject to human desires.*²³

Augmented reality is still a technology in its infancy. It has not yet adopted by the mainstream, and we have not yet seen any disruptive societal outcome of this technology. Moreover, neither the technology industry nor the public is thoroughly convinced about its potential network effect. However, this stage is where we experiment and become a part of the shaping of this technology. As artists and critical practitioners, our explorations of the emerging technologies gain our knowledge about their affordances and pitfalls. It is also possible to consider our practices in the technology realm as poaching. Commercial, industrial and institutional uses of these technologies tend to try and dominate the territory, push the technology to the direction of their will. In the meantime, we should keep working with these tools to carve out our space in the territory and leverage them to augment our counter-power.

23 Tufekci 2017, 118.

CHAPTER 3

Augmented Reality Technology

3.1 What is Augmented Reality?

In his 1997 survey paper, Ronald Azuma defined AR as follows:

Augmented Reality (AR) is a variation of Virtual Environments (VE), or Virtual Reality as it is more commonly called. VE technologies completely immerse a user inside a synthetic environment. While immersed, the user cannot see the real world around him. In contrast, AR allows the user to see the real world with virtual objects superimposed upon or composited with the real world. Therefore, AR supplements reality, rather than completely replacing it.¹

His definition is still the most widely accepted definition of AR to the date. In the same paper, he also identifies three characteristics of AR systems:

1. Combines real and virtual

¹ Ronald T. Azuma, "A Survey of Augmented Reality," Presence: Teleoperators and Virtual Environments 6, no. 4 (1997): pp. 355-385, <https://doi.org/10.1162/pres.1997.6.4.355>.

2. Interactive in real-time

3. Registered in 3-D²

Azuma's criteria achieve being definitive without being limited. He does not reduce AR to a particular sensory input—such as visual—or a device output—such as head-mounted displays.

As it is almost always the case for novel technologies, terminology, definitions and perceptions from the early days of AR start to feel limited as we develop the technology further. Replacing or improving the outdated terms might become necessary over time, in order to avoid the restrictions, these old terms and perceptions may impose on the future of AR. For example, Paul Milgram, Haruo Takemura, Akira Utsumi and Fumio Kishino presented a linear taxonomy of “Realities” in their 1995 paper (see *Figure 5*). Their reality continuum is still useful, and widely popular in the field. However, when we try to classify today's applications using this continuum, some of them do not fit. Augmentation, by nature, refers to making additions, supplementing, elevating or extending something. Today, we see applications that mediate or manipulate the physical space in the ways that we can not consider as augmentation. For this reason, the “augmented reality” term falls short of today's wide spectrum of applications. However, in this thesis, I use “augmented reality” since it is widely accepted in research and industry.

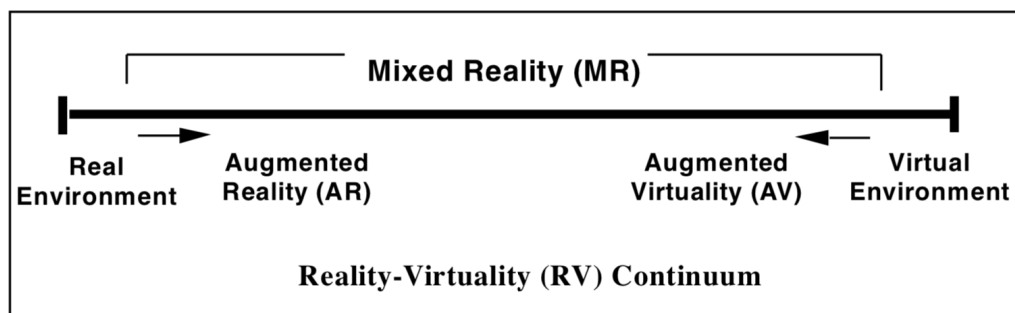


Figure 5. Simplified representation of a RV Continuum (Milgram et al. 1994, fig. 1)

The evolution of Augmented Reality

Ivan Sutherland proposes the ultimate display in his 1965 essay with the following words:

² Registered in 3-D is a technical term for blending into the real world as it were really there.

*The ultimate display would, of course, be a room within which the computer can control the existence of matter. A chair displayed in such a room would be good enough to sit in. Handcuffs displayed in such a room would be confining, and a bullet displayed in such a room would be fatal. With appropriate programming such a display could literally be the Wonderland into which Alice walked.*³

In the technology field, his manifesto is considered as the early vision for today's Virtual Reality environments. In the same essay, Sutherland also predicts AR (as cited in Schmalstieg and Höllerer 2016, 35) with this sentence: "The user of one of today's visual displays can easily make solid objects transparent—he can "see through matter!"⁴. Later in 1968, he and his student Bob Sproull introduced the first head-mounted three-dimensional display⁵. Sutherland called the head-mounted display "The Sword of Damocles" because the system needed to be attached to the ceiling due to its weight⁶. Although research and industry often refer to their work as the first Virtual Reality headset, and most possibly it inspired the technology, The Sword of Damocles was a see-through display. This feature makes it a pioneer for AR systems too.

When the term Augmented Reality was coined by the Boeing aircraft researchers Tom Caudell and David Mizell in 1992, years after Ivan Sutherland's work, the technology was still an exclusive tool which required complex hardware found in specialised research labs. However, today, we carry incredibly advanced cameras, and GPS sensors in our pockets and the ascend of AR have become possible by the ubiquitous use of these hand-held mobile devices.

3 Ivan Sutherland, "The Ultimate Display," Proceedings of IFIP Congress, 1965, pp. 506-508, [http://worrydream.com/refs/Sutherland - The Ultimate Display.pdf](http://worrydream.com/refs/Sutherland-The%20Ultimate%20Display.pdf).

4 Sutherland 1965.

5 Ivan Sutherland. "A Head-Mounted Three Dimensional Display." Proceedings of the December 9-11, 1968, Fall Joint Computer Conference, Part I on - AFIPS 68 (Fall, Part I), 1968. <https://doi.org/10.1145/1476589.1476686>.

6 "Digital Art in Game Design " VR History – Ivan Sutherland and the Sword of Damocles." Digital Art in Game Design. Accessed October 1, 2019. <http://students.expression.edu/thatoneblog/2016/08/09/vr-history-ivan-sutherland-and-the-sword-of-damocles/>.

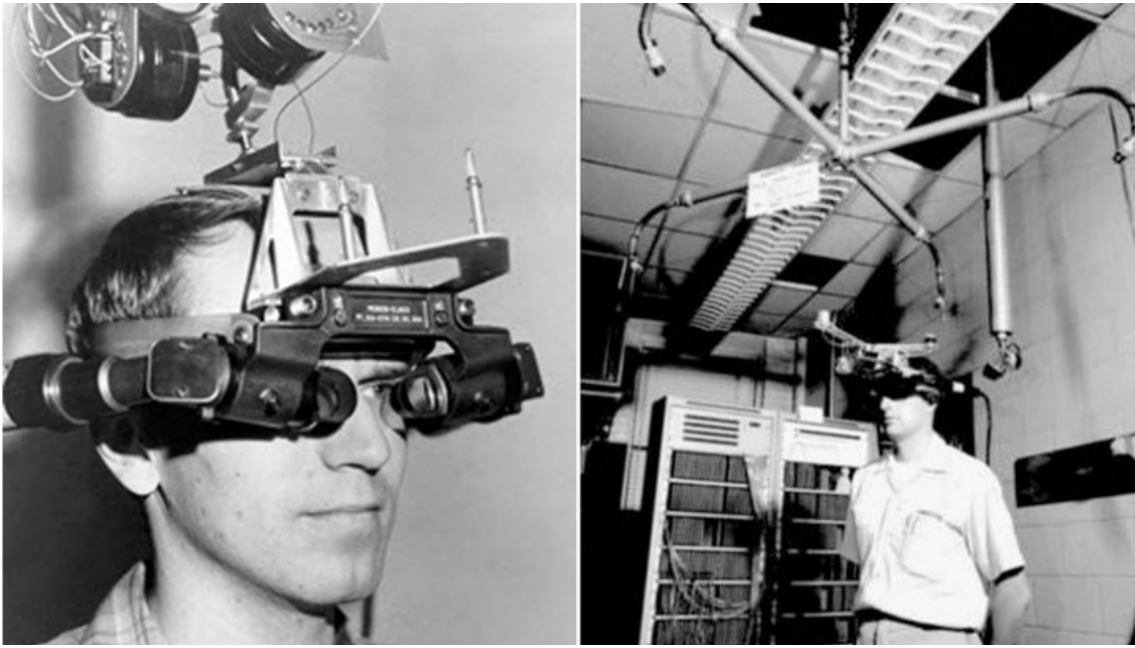


Figure 6. Accessed October 1, 2019. <http://students.expression.edu/thatoneblog/2016/08/09/vr-history-ivan-sutherland-and-the-sword-of-damocles/>.

Although the advent of mobile devices sparked interest for mobile AR in the early 2000s, mobile AR did not take off until the release and spread of smartphones. The advanced processors, sensors and cameras on smartphones allowed software developers to create sophisticated AR systems. For example, in 2009, Yelp released the AR way-finding feature Monocle in its iOS app. Another example Word Lens—an AR app which recognises printed words in the physical world using optical character recognition, and instantly replaces these printed words with the digital translation— was released in late 2010.

We saw more and more commercial uses of AR in the following years, the most notable of those were Google Glass wearable AR glasses, Magic Leap professional-grade AR head-mounted display, and Pokémon Go; the most viral AR application to the date. This location-based AR game, created by Niantic, pushed AR forward into the mainstream and sparked meaningful discussions about how AR might change our lives and societies. The current viral trend in mobile AR as of today is the AR face filter feature on Snapchat, Facebook messenger, and Instagram stories.



Figure 7. Screenshot from the Official Word Lens Demo by Quest Visual, Inc. Accessed October 1, 2019. https://en.wikipedia.org/wiki/Word_Lens#/media/File:WordLensDemo5Feb2012.jpg.

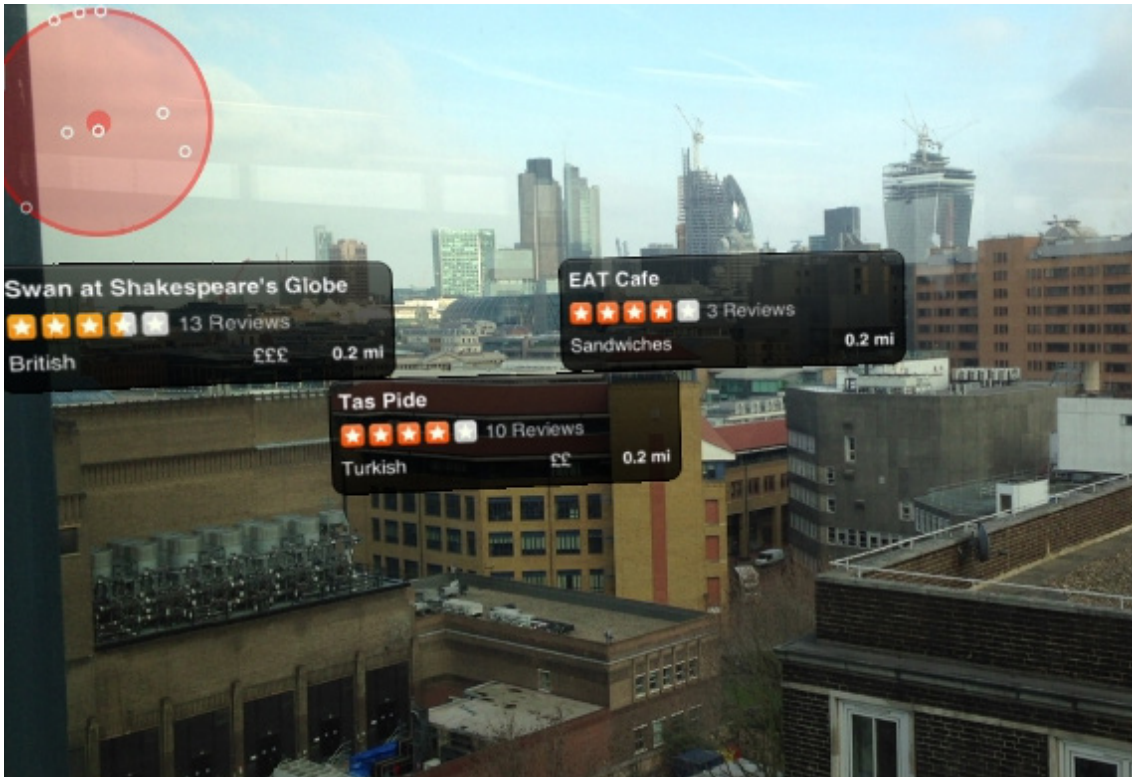


Figure 8. Trusted Reviews. Accessed October 1, 2019. <https://www.trustedreviews.com/reviews/yelp>.

3.2 Current popular implementation methods of AR

In this section, I will talk about the technological landscape available for creating visual AR experiences for hand-held mobile devices. Of course, some of these technologies overlap with wearable AR solutions or, even though not widespread, laptop or desktop and webcam use. However, since my focus is on hand-held mobile devices in this thesis, I mainly surveyed this type of output. I use the term “mobile” only for hand-held mobile devices while I will refer to head mount glasses as wearables or HMD.

Currently, there are quite a few ways of creating a mobile AR experience, but all these options can be divided into two main groups. I will briefly introduce these options through examples and discuss their advantages and disadvantages.

1- Creating the content and publishing it on an AR authoring & publishing software

Layar, Wikitude and Junaio were the pioneers of this type of AR developer software. Junio, the first AR browser which used latitude/longitude/altitude data (LLA markers) from the mobile phone instead of The Global Positioning System (GPS) for improved location accuracy, was killed after Apple’s acquisition of the creator company Metaio. Layar and Wikitude are still active; however, Layar has become a paid enterprise marketing solutions tool. Therefore, Layar is no longer a contender for being a flexible, creative tool. Wikitude, on the other hand, could still be a good option depending on what the creator is trying to achieve. It offers two different products for AR development; the first one is Wikitude Studio--a web app in which one can create an AR experience and publish it on Wikitude’s mobile applications. Wikitude Studio offers a minimal feature set, but it can be enough as a start or to quickly test a simple AR idea. The other product of Wikitude is its main product and is a Software Development Kit (SDK), which means that it is designed to accompany the creator’s software development pipeline on other platforms.

In the early days of these authoring tools, a marking/tracking object was required

to place the virtual-object into the physical world. This technique is relying on image recognition. However, a lot has changed within the last few years with the advent of depth-sensing cameras on new mobile devices, and the advanced development platforms such as Apple's ARKit and Google's ARCore. Phones now can sense depth and the surfaces in the space they are in. Therefore they can place the virtual object in the space without the need for a tracking object.

Even though we no longer need the tracking objects to be able to place virtual objects into the real world accurately, a lot of authoring & publishing tools available today still work with a tracking image since newer hardware and software were released only within the last two years. We are currently in the midst of a big wave of AR authorship tools. There is a big trend of "no-coding" creators' software, which indicates a future with an inclusive content creator/prosumer ecosystem. Snapchat released Lens Studio in 2018, and Facebook's Spark AR followed it. Snapchat marketed Lens Studio with the promise of location-based experiences; however, this feature is only available for several famous landmarks around the world. Apart from lacking the locative capability, both Spark AR and Lens Studio are powerful tools for creating face filters and are widely used by many creators.

2- Creating the content on a content creation software, developing the experience and publishing it on one a mobile platform

If a creator wishes to produce more sophisticated AR experiences and do not want to be limited by the short set of features an AR authorship application can offer, or if the goal is to publish experiences in a dedicated application, they need to create their software. This process involves content creation and experience creation steps. For three dimensional (3D) content, the creator can use a 3D modelling tool—such as Blender, Cinema4D, Autodesk Maya, Sketchup. Two dimensional (2D) content can be created using 2D graphics software—such as Sketch, Figma, Adobe Photoshop. There are two different routes to follow for the experience creation step. The first path is creating the experience directly in the development environment of the target platform. For mobile devices, the most popular platforms are ARKit of Apple and ARCore of Google. The second path is creating

the experience and even the application in Unity and publishing it to the mobile platform. The second option gives the creator the ability to publish their experience both to iOS and Android. If they want to publish to both of them, instead of developing separate applications for each platform, one should consider creating the experience on a software which supports cross-platform publication, like Unity. As I will explain further in Chapter Four, I followed this approach.

Lastly, I would like to mention a relatively novel method which is still now fully grown: WebXR. Mozilla announced a draft WebXR API (Application programming interface) proposal as early as October 2017⁷. Since early 2018, a group of “engineers from Mozilla, Google, Samsung, Amazon and other companies”⁸ have been working together under the name of Immersive Web Community Group (<https://immersive-web.github.io>), on developing the project as a web-based standard. The promise of the project is enabling the creation of browser-based Augmented Reality and Virtual Reality experience, as well as distributing the same experience across the whole spectrum of AR and VR devices such as HMD and mobile platforms. Both Mozilla and Google are currently working on experimental browsers, but at the moment, they are not ready for the end-users. Mozilla released an iOS application which runs “AR experiences built with web technologies and Apple’s ARKit”⁹ which makes AR development more accessible to the web development community. If the project achieves its promise and provides complex AR experiences on browsers in the future, sharing AR experiences with a broader audience can become much easier just by sharing a web address. However, in its current state, this method is not a reliable option, and it does not make any difference in terms of reaching out to more users since it requires downloading an application.

7 “Bringing Mixed Reality to the Web.” The Mozilla Blog, October 20, 2017. <https://blog.mozilla.org/blog/2017/10/20/bringing-mixed-reality-web/>.

8 “Mixed Reality & VR.” Mozilla Research. Accessed October 1, 2019. <https://research.mozilla.org/mixed-reality/>.

9 “Mixed Reality & VR.” Mozilla Research. Accessed October 1, 2019. <https://research.mozilla.org/mixed-reality/>.

3.3 Future of Augmented Reality

There is much uncertainty around the future of the AR as it is still an emerging technology. What we were able to achieve using AR so far inspires us to imagine numerous future scenarios and applications. However, there are several technical and social challenges we need to tackle for AR to go mainstream. In this section, I will present some of the current trends that might have a significant influence on the future of AR.

AR cloud

Majority of the AR applications today are “experiences” which you explicitly initiate and finish. We did not experience a breakthrough use case which makes AR an integral part of daily life. This breakthrough may not happen until AR content is persistent in the real world. By this, I mean that there is not a persistent virtual layer, like world wide web, which is accessible by everyone and would show the same content to everyone, regardless of their device and software. Today we download an application available for our device and operating system and view a particular AR content only on that application. AR Cloud is envisioned as this missing persistent, real-time, interactive layer over our physical world. In other words, it will be a digital replica of the world which serves as connective tissue between our physical and virtual realities.

The AR Cloud concept we describe here is different from the existing systems that provide AR services from the cloud. We can name Vuforia, Blippar, Catchoom or the early trailblazers like Wikitude, Layar and Metaio (Junaio) as examples. What these companies are doing is either storing the location information for displaying the AR content or displaying the AR content when the camera recognises a marker. To further clarify, let us imagine an AR experience creator. They want their experience to appear only at particular locations in the world. The first way to achieve this is by adding coordinates of these locations to their development software. The second way is visiting those locations and placing physical tracking images for visitors to scan with their camera to view the experience. The third and relatively high-tech way is again visiting the location and taking pictures and

videos of the environment to create the point cloud data of the site so that the visitor's camera can recognise the environment and place the AR experience at the desired location. This last example is closely related to the idea of AR Cloud, so I would like first to explain what a point cloud is. A point cloud is a collection of points—each defined by X, Y, Z coordinates—which represents the external surface of things. Point clouds can be generated using several methods. Software that understands depth from the lightening of the photos can generate point clouds from appropriate photos, using laser scanners and depth-sensing cameras are other common methods. We can consider point clouds as the technology which enables machines to see the world similarly as we do.

If we go back to our imaginary AR experience creator and the three methods they can use, we can say that the first way, using GPS coordinations to define locations for the software, is superior to the others because it does not require a visit to the location. However, in this option, the experience is not in a relationship with the attributions of the real scene. Therefore it is not actually in situ. The creator's experience, or the software which runs it does not know about the buildings or trees at the site. The second option is inferior to both other methods, so I will only compare the third method to the first one.

In the point cloud method, the AR experience will be somehow contextual and

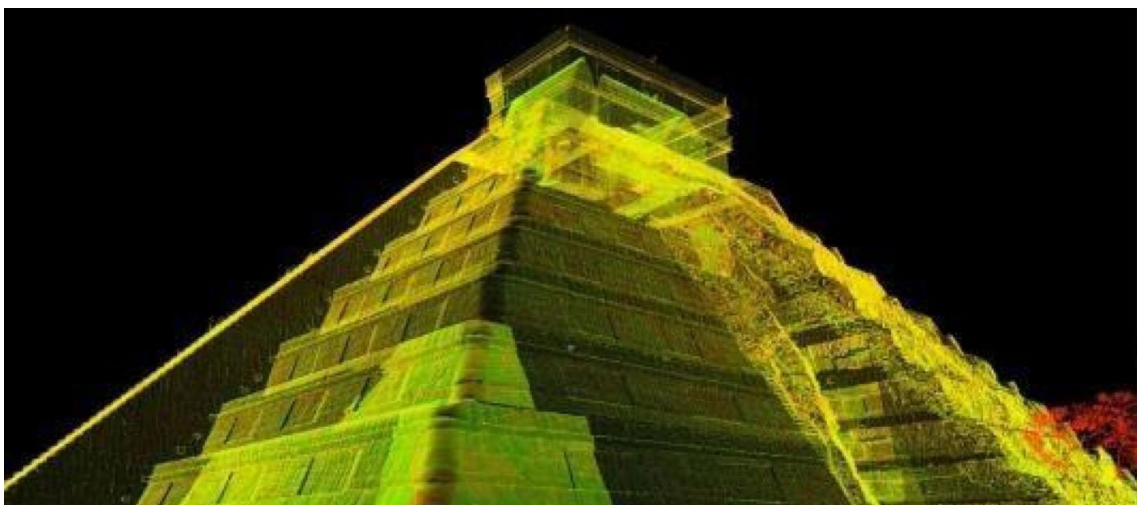


Figure 9. Digital Copy of Chichen Itza, a Heritage Site, Created by 3D Laser Scanning. © CyArk. Accessed October 1, 2019. <https://blog.hexagongeosystems.com/wp-content/uploads/2016/11/CY-ARK-facebook.jpg>.

in-situ since the software knows about the surroundings. I say somehow because any change in that environment makes the creator's point cloud data invalid. Moreover, as I mentioned earlier, the creator needs to visit the site to generate the point cloud data. Now let us imagine the fourth way, the AR Cloud method. In this world, the creator would have access to an always up-to-date point cloud copy of the whole world. They would look up for a site and place their virtual content in harmony with the context of the site. They could place it on a building, on the ground, around the trees, or anything that is there. They would create a real in-situ, context-aware AR experience. Anyone connected to this AR Cloud layer would be able to see their experience, right when they published it, across all devices and platforms. Ori Inbar explains the difference between a local point cloud—the third method we imagined for our imaginary AR creator—and AR Cloud in his 2017 article:

...these out-of-the-box solutions can only localise against a local point cloud, one at a time. Microsoft Hololens can localise against a set of point clouds created on said device — but (out-of-the-box) it can't localise against point clouds created by other devices. The search is on for the “ultimate localizer” that can localise against a vast set of local point clouds from any given angle and can share the point cloud with multiple cross platform devices.¹⁰

In the same article, Inbar proposes three fundamental features an AR Cloud system should have:

1. A persistent point cloud aligned with real-world coordinates — a shared soft-copy of the world.
2. The ability to instantly localise (align the world's soft-copy with the world itself) from anywhere and on multi-devices.
3. The ability to place virtual content in the world's soft-copy and interact with

10 Ori Inbar. “ARKit and ARCore Will Not Usher Massive Adoption of Mobile AR.” Medium. Super Ventures Blog, January 19, 2018. <https://medium.com/super-ventures-blog/arkit-and-arcore-will-not-usher-massive-adoption-of-mobile-ar-da3d87f7e5ad>.

it in real-time, on-device and remotely.¹¹

Mainstream Wearables (Goggles)

Today, the most common and convenient AR hardware is smartphones. However, AR experiences on hand-held devices bear ergonomic issues, and they involve the extra step of picking up the device and initiating the experience. Furthermore, the experience is not as immersive as it is on head-mounted displays (HMDs). These crucial factors prevent hand-held devices from becoming the future of AR hardware. Therefore we can assume that HMDs are the future displays for AR.

Modern head-mounted-displays, other popular names are goggles and glasses, are not popular among end-users yet. There are three main challenges for AR goggles to become widely used. First of all, we do not have compelling use cases yet. The existing products are mainly for entertainment or professional use cases, which brings us to the second point: high prices. At the time of writing this thesis, Microsoft HoloLens 2 is accepting preorders, and the price is \$3500 (US dollars) per device. Its biggest competitor, Magic Leap One Creator Edition's price is \$2,295. We have seen less powerful but more affordable options appearing; however, it would be realistic to say that they are not going to be massively adopted by society before a software ecosystem exists.

There are also aesthetic and ergonomic concerns regarding societal accept. For a seamless, continuous use of AR goggles, they need to stay on our faces and become a part of our daily look. For this reason, smart glasses designed for daily use are more light-weight, compared to professional or gaming headsets.

Another issue surrounding the social accept of AR goggles is privacy and surveillance concerns. Google Glass has sparked discussions about both these issues mainly because of its camera. The public was wary of people walking around

¹¹ Inbar 2018.

with a recording device on their faces. Novel smart glass designs need to consider privacy as a significant design problem. However, before the mainstream adoption of AR glasses, we are already facing major surveillance threat because of the institutional adoption of these devices. For example, in February 2018, as cited in a Tech Crunch article, Wall Street Journal reported that Chinese police started using AR goggles with facial recognition capability to surveil people who travel by plane or train¹².



Figure 10. Accessed October 1, 2019. <https://techcrunch.com/2018/02/08/chinese-police-are-getting-smart-glasses/>.

12 Russell, Jon. Accessed October 1, 2019. <https://techcrunch.com/2018/02/08/chinese-police-are-getting-smart-glasses/>.

Eye electronics and smart contact lenses have been long envisioned and discussed as a possible successor of smart glasses. It is difficult to foresee that far ahead, but from today's perspective, their invisibility may bring ergonomic and aesthetic advantages; however, they may also introduce big privacy and security issues.

3.4 Augmented Reality Art

In the book *Augmented Reality Art*, the editor Vladimir Geroimenko and multiple contributors including artists Mark Skwarek and Patrick Lichty indicate 2010 as the emergence of Augmented Reality Art ref¹³. This is the year when a group of artists created an AR intervention in MoMA, New York. Following to the MoMA intervention, the same artists established a collective called Manifest.AR and they released a manifesto on 25 January 2011. While I consider the whole manifesto as an intriguing food for thought, especially this bit resonates with my thoughts and is directly relevant to the context of my artwork:

*Now hordes of Networked AR Creatives deploy Viral Virtual Media to overlay, then overwhelm closed Social Systems lodged in Physical Hierarchies. They create subliminal, aesthetic and political AR Provocations, triggering Techno-Disturbances in a substratosphere of Online and Offline Experience.*¹⁴

2010–2011 were active and exciting years for AR art. Manifest.AR members, especially Mark Skwarek, as I mentioned in Chapter Two, pioneered the field and helped AR gain recognition among art and critical technology networks. Nevertheless, they were not the only ones who walked the field. For example, the artist collective 4Gentlemen's Tiananmen Square project is one of the most moving works in the field. The artists virtually revived The Goddess of Democracy statue—removed by the regime—and the Tank Man; then published it on Layar App

¹³ Vladimir Geroimenko, *Augmented Reality Art: from an Emerging Technology to a Novel Creative Medium* (Cham: Springer, 2014), vii.

¹⁴ “Manifest.AR Artist Group AR Art Manifesto.” Manifest.AR Artist Group AR Art Manifesto. Accessed October 1, 2019. <http://manifest-ar.art/>.

(which is no longer active). The collective describes their work on their website:

Although it has been more than twenty years since Tiananmen Protest took place in 1989, the authority persistently uses all means erasing the facts that Chinese people pursued democracy in this democratic and anti-corruption movement. In China, nowadays, young people are not aware the courageous actions, such as ‘Tank Man’ and erecting ‘Statue of Democracy’ facing Mao’s portrait on Tiananmen Tower, emerged during student movement of 1989. Nonetheless, history should not be forgotten.¹⁵



Figure 11. Statue of Democracy on Tiananman Square 1989, and the Virtual Version. January 31, 2011. https://3.bp.blogspot.com/_Yc1waN7LwCI/TUhKZnq15iI/AAAAAAAAAAG/y_UtZ-3WqtY/s1600/tiananmenAR.jpg.

¹⁵ 4Gentlemen. “Diary in Exile,” January 31, 2011. https://fourgentlemen.blogspot.com/2011_01_01_archive.html.



Figure 12. Tank Man on East Chang'an Street in Tiananmen Protest 1989, and the 3D Version. January 31, 2011. https://2.bp.blogspot.com/_YcIwaN7LwCI/TUHLbgaVki/AAAAAAAAAAk/l13UpIIHy08/s1600/tankMan1.jpg.

The recent years have not been as active as the early 2010s in terms of activist applications of AR art. Since AR has not yet achieved widespread public adoption, socially engaged projects often can not go beyond experimentation unless they overcome this barrier. My artwork is also facing this issue. Today, most of the artists who are working with AR are exploring the capabilities of this technology and are creating inventive experiences. Among them, Zach Lieberman (<http://zach.li>) is the most well-known with his visual and audio experiments in AR. Many dynamics might have caused this change in the trends, but one of the explanation can be made through Gartner Hype Cycle—despite the criticisms about its reliability¹⁶. If we evaluate AR art history using the Hype Cycle (see Figure X), we can argue that the early examples of AR art were produced during the “Peak of Inflated Expectations” stage. Since the mainstream adoption of the technology has not happened yet, I argue that today, we are on the “Slope

16 M. Steinert and L. Leifer, “Scrutinizing Gartner’s hype cycle approach,” *PICMET 2010 TECHNOLOGY MANAGEMENT FOR GLOBAL ECONOMIC GROWTH*, Phuket, 2010, pp. 1-13.

of Enlightenment” stage. My artwork and the early examples of AR art are similar in their core; their prior goal is social engagement. This engagement will not be achieved at a high level until the mass adoption of AR comes true. According to Howard Fosdick’s article, *The Sociology of Technology Adaptation*, the public acceptance of a new technology correlates with the profitability of the technology in question¹⁷. Therefore, we can anticipate the appearance of more AR artworks in the upcoming years, in the public space, in galleries, and on the web.

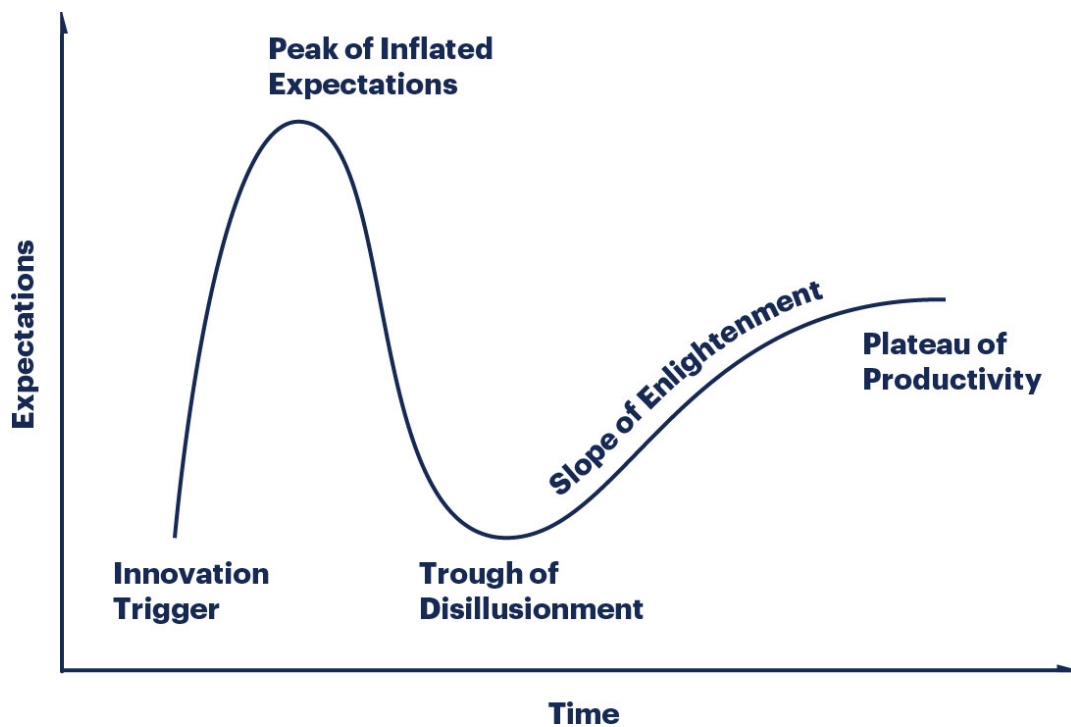


Figure 13. Gartner Hype Cycle. Gartner. Accessed October 2, 2019. <https://www.gartner.com/en/research/methodologies/gartner-hype-cycle>.

17 Fosdick, Howard. “The Sociology of Technology Adaptation.” *Enterprise Systems Journal*, 1992. [http://www.rexxinfo.org/Sociology of Technology Adoption/SOCIOLOGY_1.HTM](http://www.rexxinfo.org/Sociology%20of%20Technology%20Adoption/SOCIOLOGY_1.HTM).

CHAPTER 4

Making *The Virtual Monument for 10 October 2015 Bomb Attack Victims*

In this chapter I will provide a detailed look at my artwork and lay out the creation process. This process is comprised of three main phases; the first one was designing the participant experience. Before I created the virtual monument, I defined my objectives, my audience and designed how this virtual monument was going to be experienced by them. I handled this step as a design project since my artwork is experienced through a software and made use of my design knowledge as a digital product designer. In the second phase I created the artwork and implemented it as a proof of concept. Finally I tested my proof of concept with a group of voluntary participants.

4.1 Designing the experience

In this first phase, I designed a case-agnostic AR intervention experience which can be applied to different sites and artworks. I focused on the audience and potential cases in urban areas in Turkey, however, a similar approach can be used for other social contexts too. I started with defining design objectives and principles. The main reason to do this is establishing a foundational set of guides to follow throughout the design process. Objectives and principles help to make decisions, achieving a consistent outcome and evaluating one's work after sharing it with others. I followed this step by generating personas. Alan Cooper, a software designer and programmer, introduced persona generation, today it is a widely used method in design disciplines. Cooper describes personas as fictional, archetypal representations of real user groups¹. Personas are created based on the knowledge of hypothesised real-life users and the designer adds imaginary details to make the personas convincing. Cooper explains in his book *The Inmates Are Running the Asylum*:

*Although they are imaginary, they are defined with significant rigor and precision. Actually, we don't so much "make up" our personas as discover them as a byproduct of the investigation process. We do, however, make up their names and personal details.*²

I created my personas mainly to search an answer this question: How can I make inhabitants of the city experience an insurgent AR artwork? As I stated previously, AR is not a widespread technology yet, even though many people own devices capable of running AR experiences, and overcoming the familiarity barrier is a challenge. Therefore, I wanted to realistically group and prioritise my audience based on their likelihood of participating in an experience. Also, I wanted to design the experience in a way to reach out to as many people as possible. I used the information I collected from informal interviews I conducted with people who live in Ankara, over the incubation and preparation period of my thesis, and

¹ Alan Cooper, *The Inmates Are Running the Asylum* (Indianapolis, IN: Sams, 2004), 124.

² Cooper 2004, 124.

my familiarity with the culture, to generate the personas.

After the persona generation step, I created two main scenarios. Before I talk further about these scenarios, it seems useful to introduce scenarios in the design context. John M. Carroll describes scenarios as stories which “...support reasoning about situations of use, even before those situations are actually created”.³ According to Carroll, “Scenarios evoke reflection in the content of design work, helping developers coordinate design action and reflection”.⁴ As Carroll remarks, I created my scenarios to reflect on two different ways to publish an AR artwork: a stand-alone app dedicated to the experience, or on a popular platform with the existing social network. Both of these scenarios are structured around a fictional artist, a fictional participant and an undefined, hypothetical artwork. I will introduce these scenarios later in the “Scenarios” subsection.

Design objectives:

- To overcome censorship and intervene with the authorities’ power in public space by harnessing digital technologies to gain resilience.
- To protect the safety of the artist by eliminating the need for physical presence at the site.
- To generate conversation between the people who experience the artwork and foster a sense of togetherness and solidarity.

Principles:


- Do not further or re-traumatise the participant.
- Do not intentionally put the participant in danger, if there is a possible danger, warn them about it.
- Make the experience accessible to as many people as possible.
- The experience should not require more than simple technological literacy.

3 J.m. Carrol, “Five Reasons for Scenario-Based Design,” Proceedings of the 32nd Annual Hawaii International Conference on Systems Sciences. 1999. HICSS-32. Abstracts and CD-ROM of Full Papers, n.d., <https://doi.org/10.1109/hicss.1999.772890>.

4 Carroll 1999.

- Anybody who can use a smart-phone should be able to experience the artwork.
- The experience should be accessible through widely used hand-held mobile phones.

4.2 Personas



Early adopter

DISSIDENT, TECH SAVVY
INTELLECTUAL

28 years old
University graduate
Project manager
Tech savvy
Open minded
Worried about the future

Biography

- She is Interested in culture and arts.
- Does not regularly follow traditional media (newspaper, tv).
- Uses Twitter, Facebook, Instagram, Linked.in on a daily basis.
- Part of several online messaging groups.
- Directly and deeply affected by the traumatic events in the city.

Motivations for visiting the AR artwork

- She is interested in art and activism. She has an active social and cultural life, she tries to follow the culture event in the city.
- She is within the immediate social media/real life social circle who will first hear about the artwork.
- She is excited about new advances in technology.

Challenges

- The possibility of an unpredictable reaction from the authorities.
- She might have hesitations about her safety, and would avoid engaging with the police.

Figure 14. “Early adopter” persona.

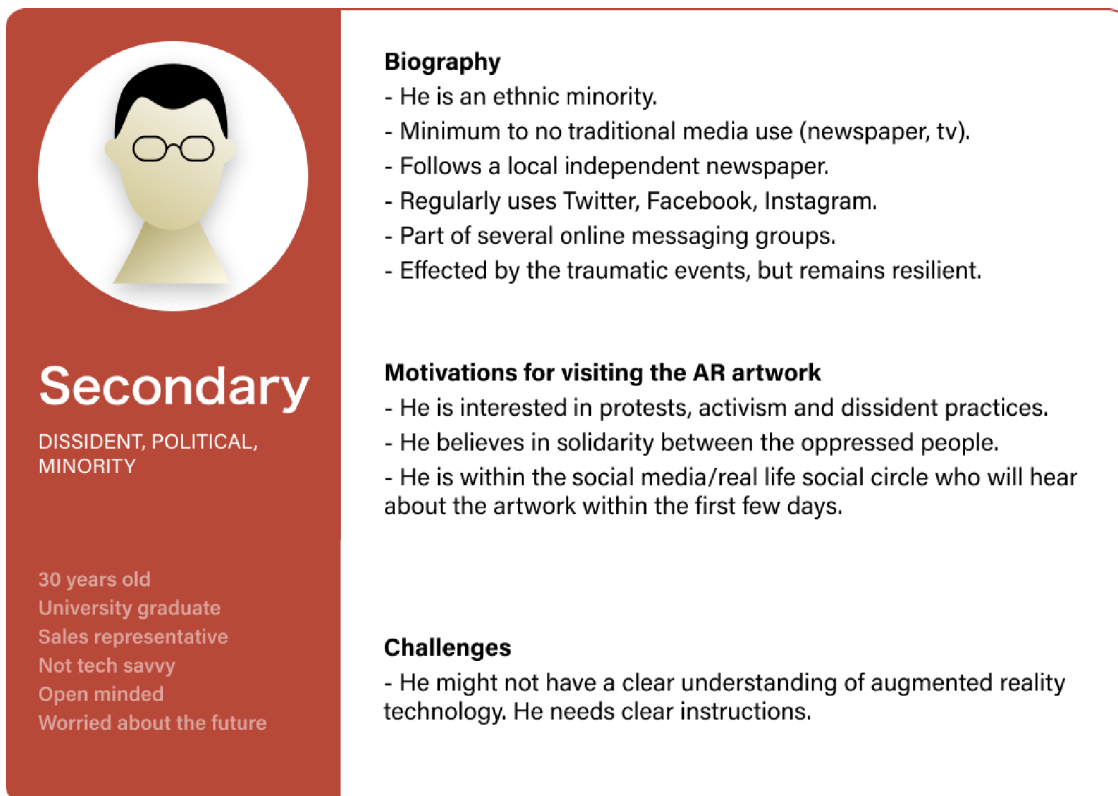


Figure 15. "Secondary" persona.

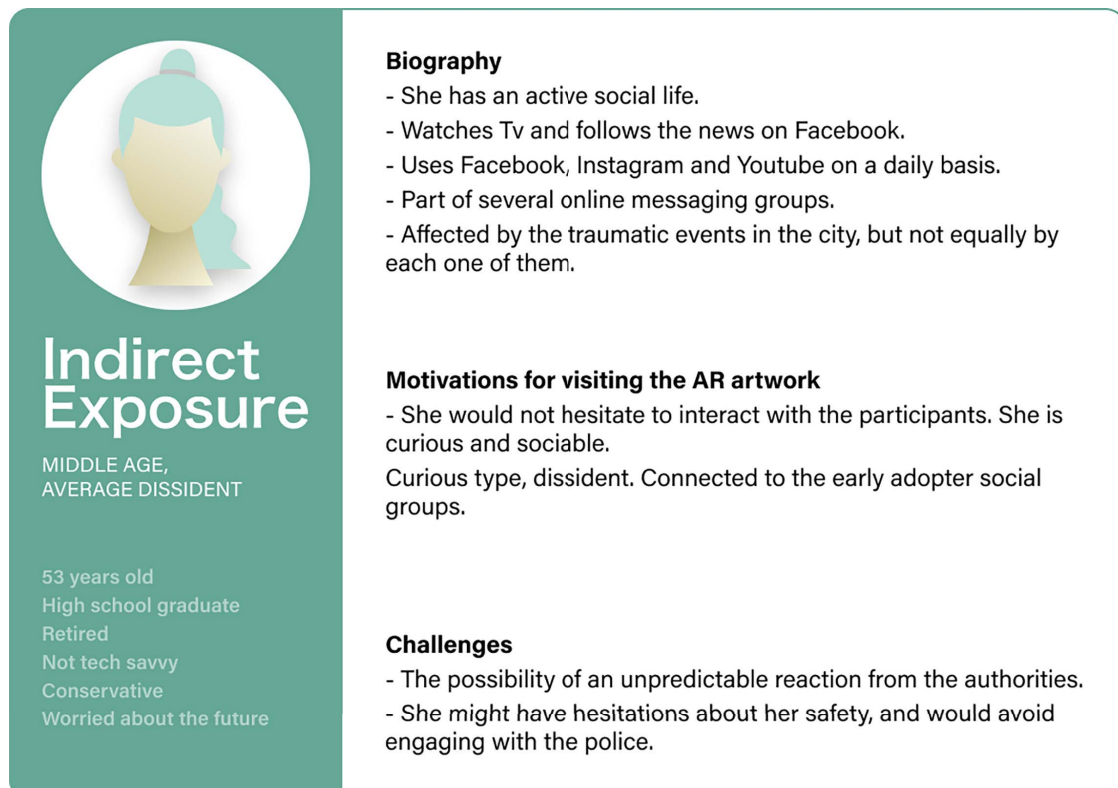



Figure 16. "Indirect exposure" persona.



Almost Impossible

GOVERNMENT SUPPORTER,
MIDDLE AGED MAN

58 years old
Elementary school graduate
Owns a shop
Not tech savvy
Conservative
Optimistic about the future

Biography

- Spends most of his time at this shop.
- Avid tv audience, sometimes reads the newspaper.
- Supports the authority.
- Upset about the economical crisis.
- Regularly uses Facebook.
- Part of online messaging groups with family and friends.

Motivations for visiting the AR artwork

- He would not find out about the artwork unless it goes extremeley viral or if he runs into other people experiencing it.
- He would not hesitate to interact with participants. He is a sociable person.

Challenges

- Prejudice due to his political stance.
- Lack of technological literacy.
- He is not connected to the early adopter social groups.

Figure 17. “Almost impossible” persona.

4.3 Scenarios

Using scenarios, I wanted to reflect on two fundamentally different approaches I thought of:

1. Exhibiting the artwork through a stand-alone application dedicated solely for artists’ use. The artist/artists can place their virtual artworks on any location in the world. Users need to download the app to be able to see the artworks.
2. Exhibiting the artwork through a hypothetical, social media platform with an AR authorship feature (i.e. Snapchat with a global location-based network). The artist can place their work in a location using this platform, and the audience experiences the content through the social media app of the platform.

Both of these scenarios start with the artist’s story. From the artists perspective, perhaps there would be many technical differences between using the tools of

a dedicated art platform and the tools provided by a social media platform. It is also possible for production processes to become very similar due to the standardisation in the industry. Imagining the details about the production does not bring much value at this point; therefore, I created a low fidelity scenario to outline the fundamental steps for both the artist and the participant.

Artist's flow

In the first step of this flow, we see the artist creating their digital artwork and publishing it on a location. I illustrate a GPS based locativity feature which enables the artist to affix their work to a location on the Earth. As I talked about in the Future of Augmented Reality subsection of Chapter Three, this is currently

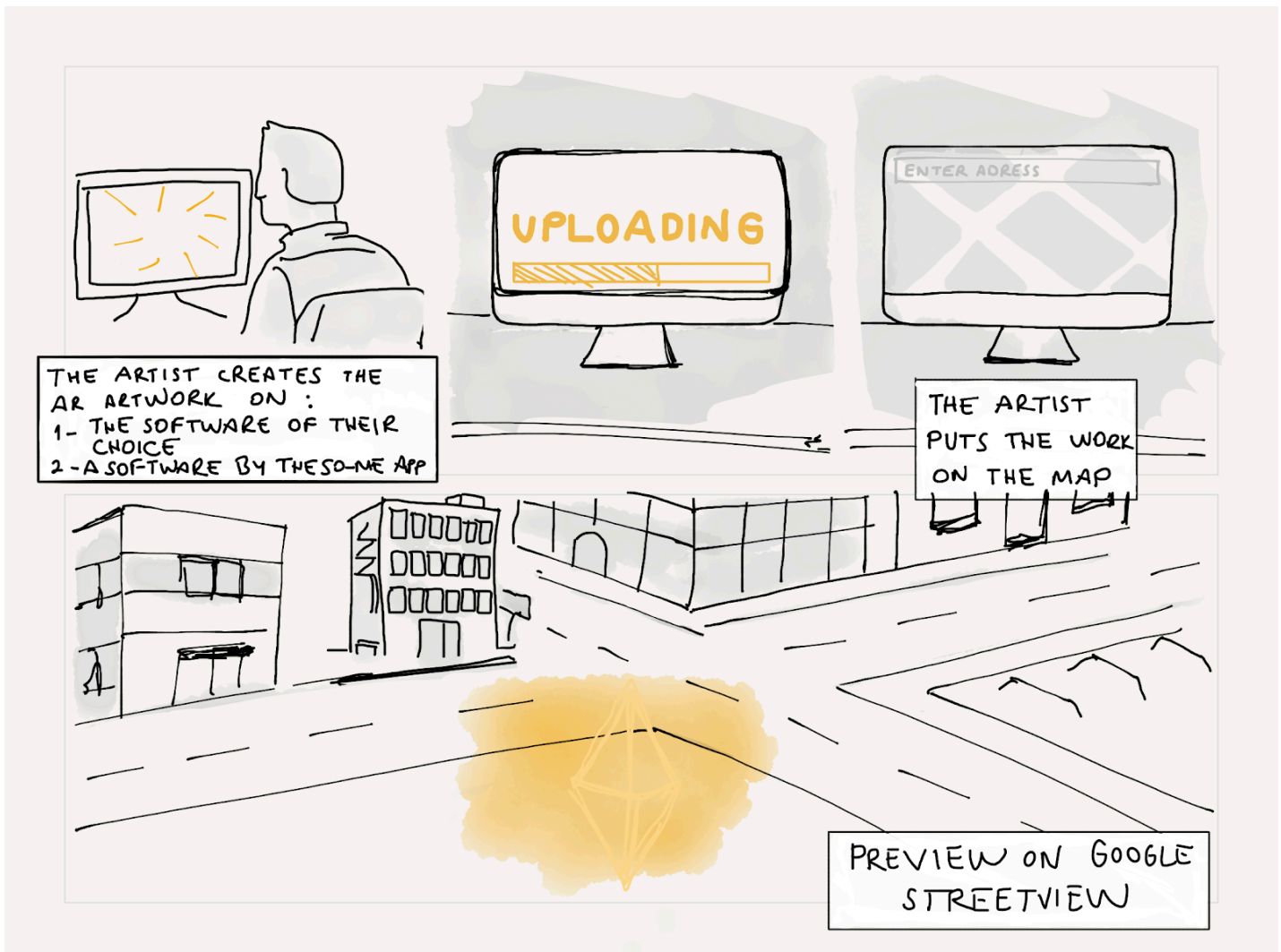


Figure 18. Artist's scenario.

our only option if we want to avoid visiting the site, until AR Cloud is possible.

Scenario 1: A dedicated application for the artist/artists

In the first scenario, the participant somehow finds out about the application, which is one of the biggest challenges that face this approach. Critical and activist projects, especially the one engages with emerging technologies, tend to remain within the activist circles. When the users download the application, the map of the city shows the locations of the interventions. Users receive a notification when they are nearby to an artwork. By following the visual directions, the user arrives at the installation site, and once they enter the experience range, they start experiencing the intervention.

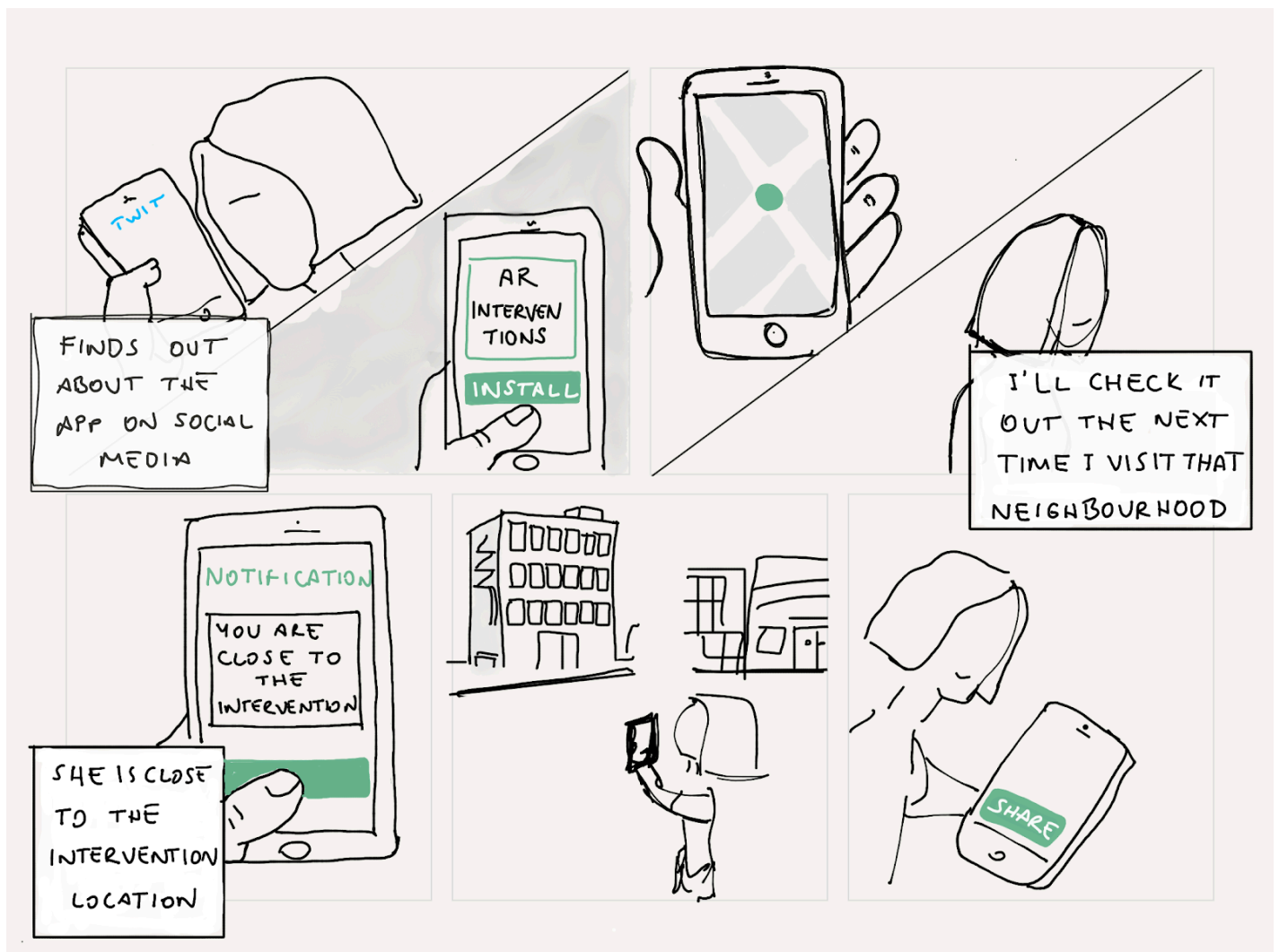


Figure 19. Scenario 1, part 1.

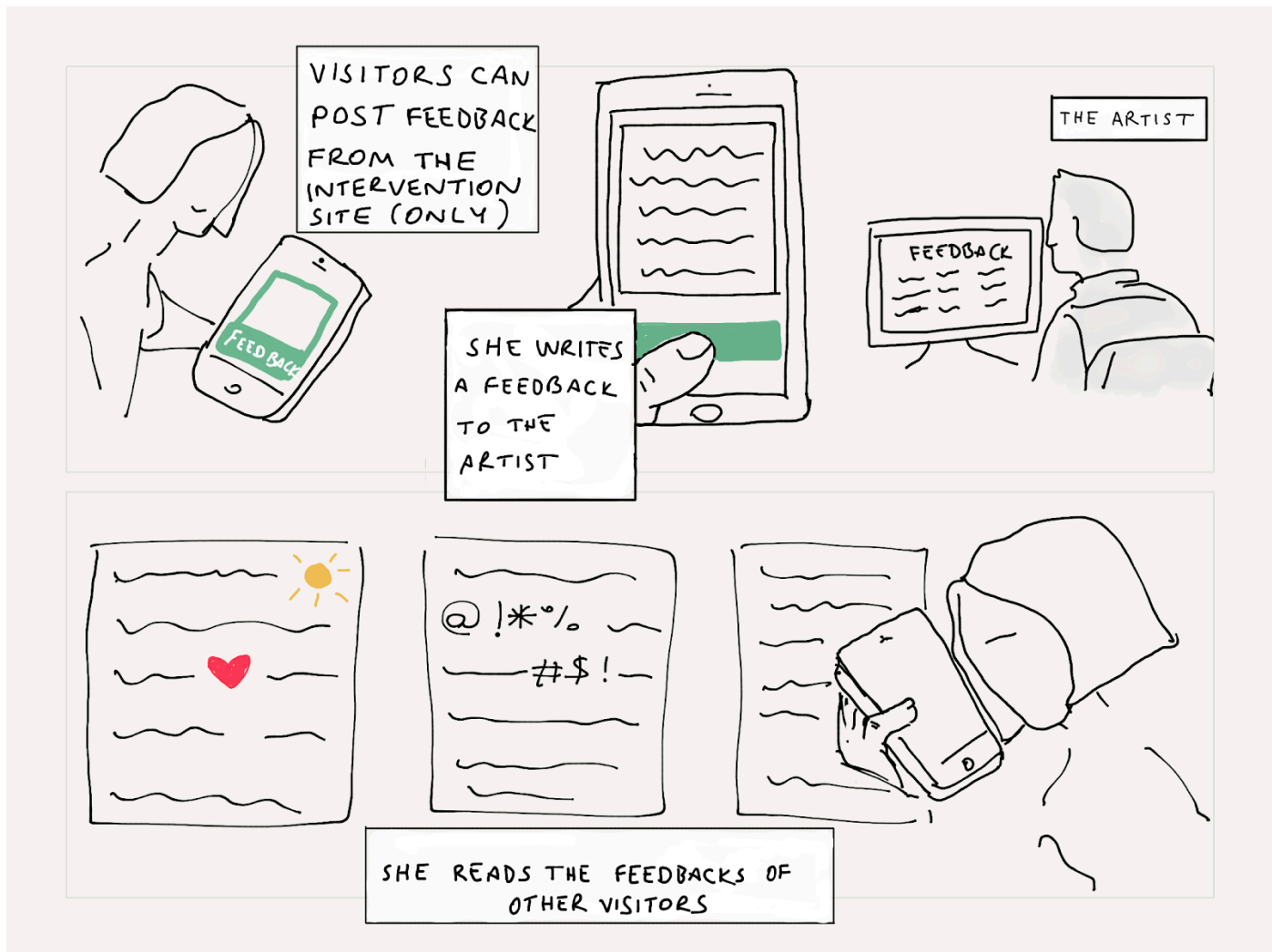


Figure 20. Scenario 1, part 2.

Advantages:

- Corporations do not own the tool or artwork. The artist can keep them alive as long as they want to.
- The artists do not need to rely on the big social media companies for the security and privacy of their information.
- The application can create or bolster artist communities.

Disadvantages:

- The participant needs to download the app.
- The application needs to reach out to the audience in some way.

- The platform needs to be extremely sensitive about the data privacy and safety of the artists.
- Probably only attracts people who are already interested in the topic. It is difficult to expand the reach of an “activists only” platform.
- Maintaining & supporting this kind of platforms is expensive and time-consuming. They are not very resilient unless they are profitable.
- They tend to be only local; making a global platform is challenging.

Scenario 2: A social media platform with an AR authorship feature

Physical public art installations are vulnerable to censorship and vandalism. Nevertheless, they are visible to the majority of the people around them, without need for any hardware or software. AR is incomparably out of sight, and if we would prioritise reaching out to as many people as possible, an existing platform is the preferable one among these two scenarios. In order to make an AR experience visible to a broader audience, using a popular tool that is already on people's phones is a better strategy than creating a new platform. Zeynep Tüfekçi, in her book *Twitter and Teargas*, writes about Facebook's widespread use in 2011 Tunisian protests and highlights the “network effect” of the platform: “the more people who use them, the more useful they are to more people”⁵. Besides making the experience accessible to higher numbers of people, the network effect makes big social media platforms resilient against government ban. Ethan Zuckerman's “cute cat theory” (as cited in Tufekci 2017, 20) suggests that the platforms that we mostly used for mundane socialisation activities, such as sharing “cute cat” pictures, can become more politically powerful than those that are designed for political action; because it is harder to censor platforms with large user numbers. Although I am talking about an imaginary platform here, only because none of the current platforms enables us placing our artwork at a location in the world, many creators around the world use Snapchat Lens Studio or Spark AR to generate face filters or landmark filters.

5 Tufekci, Zeynep. *Twitter and Tear Gas: the Power and Fragility of Networked Protest* (New Haven, CT: Yale University Press, 2017), 11.



Figure 21. Scenario 2, part 1.

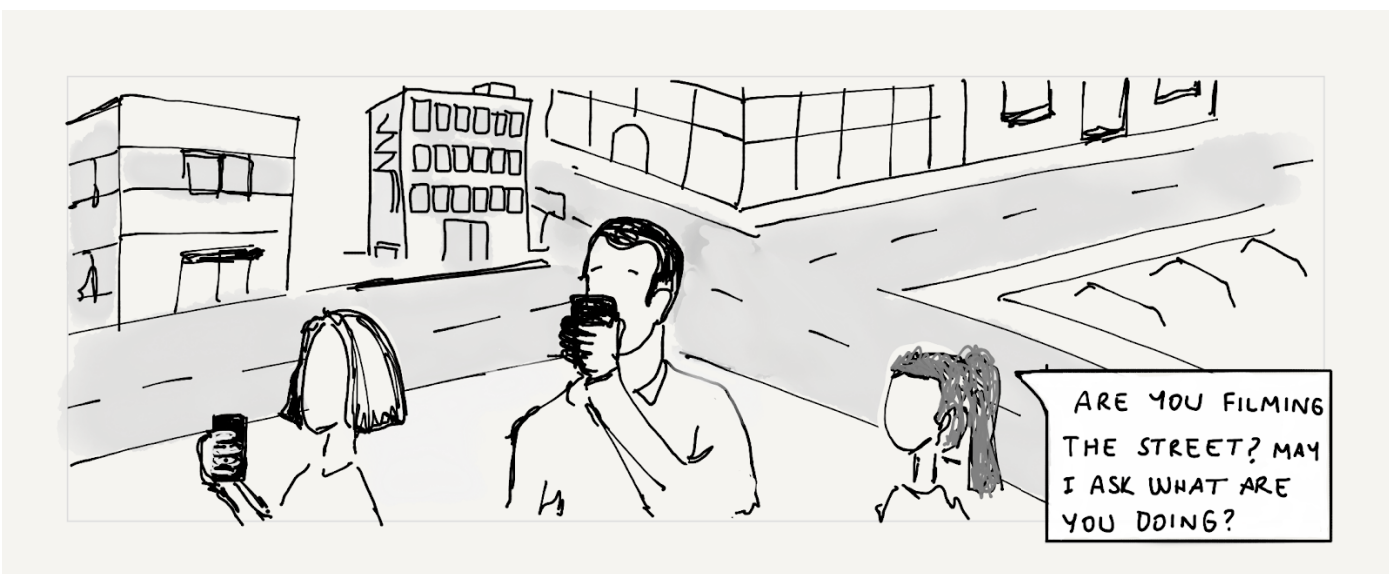


Figure 22. Scenario 2, part 2.

Furthermore, many others are using Snapchat and Instagram apps daily, to experience these creations. Therefore I do not find it speculative at all to expect these platforms to support global locative experiences soon. If a social media platform with this feature were available, I would have preferred using it for this research.

Advantages:

- The network effect. The artworks are accessible by a higher number of people and can go viral.
- Also can access to a larger creator pool, no need for advertisement.
- Artists can access to a wider audience from different backgrounds.
- The platform has global or at least multi-regional reach.

Disadvantages:

- The tool belongs to a company. The artists can lose it.
- The privacy of the artist and the user are in the hands of the company.
- Moderation can become an issue on big platforms. Censorship or lack of moderation might drive artists away from the platform.

4.4 Creating the artwork and the proof of concept implementation

The site and the artwork concept

From the very early phases of my research process, I had four significant sites in my mind, where I wanted to create my situated artwork for. I ended up focusing on the first site with this project; Central Train Station roundabout, the site of the 10th of October 2015 bomb attack. The second alternative was Güvenpark bus stop, the site of the 13th of March 2016 bomb attack, which killed 36 people. Another site I considered was Kızılay metro station exit where a protestor, Ethem Sarısülük was shot in the head by a policeman on the 1st of June 2013, the second day of the nationwide protests started in Istanbul's Gezi Park. The fourth and last option was the Human Rights Monument at Yüksel Street, which is a frequent lo-



Figure 23. Human Rights Monument at Yüksel Street, Ankara. Accessed October 1, 2019. <https://www.politikyol.com/wp-content/uploads/2017/05/insan-haklari-aniti.jpg>.

cation for protests and now is fenced by the police.

Deciding for the site seemed very difficult at the beginning. I did not have any particular reason to choose one of these traumas over the others, except for the fact that the bomb attack to the peace rally on the 10th of October 2015 was personally traumatic for me. Firstly, it was the deadliest attack in the history of Turkey. Secondly, it happened right after I moved out of the country, to Finland, in the city I lived for six years, and where my family and many friends still live. Finally, this attack was the first of many similar tragedies happened in Turkey within the following year. For all these reasons, I decided to start researching this site first. This early research about the attack and the aftermath revealed more reasons to stick to this site for my artwork.

The families of the victims have founded an organisation:10 Ekim-Der. Main objectives of this organisation are, attending the trials and demanding a monument at the site of the attack. During the years following the attack, the government of-

officials either ignored or refused the requests for a monument. Currently, there is a temporary monument at the site, built by the organisation. The city or the state did not remove it; however, it was attacked multiple times by an extreme right-wing group called Milli Türk Talebe Birli i (National Turkish Students Union). This backstory cemented my choice of the site and made it clear for me that it was



Figure 24. Attack to the Temporary 10 Ekim Monument. Accessed October 1, 2019. <https://www.evrensel.net/images/840/upload/dosya/121613.jpg>.

going to be a virtual monument for the attack.

In July 2015, some labour organisations and political parties in Turkey allied to protest the ongoing armed conflict between the state army and the Kurdish militants in the south-east region, and the government's interference in Syria's war. The alliance organised the 10th of October 2015 peace rally. One of the members of the alliance was an opposition party, HDP, of which supporters are mainly ethnic Kurds. HDP gained substantial support from the rest of the county's population as well. Media and analysts indicated their surprising rise in the 7th of June 2015 elections (four months before the bomb attack) as the main reason for the governing party to lose the majority in the parliament. The governing party had long been stigmatising the organisations and parties that criticised or questioned their politics, calling them traitors for not supporting the actions of the state. They were especially aggressive towards HDP and anyone who would coop-

erate with them. The victims of the attack and their families were no exception. Five days after the bomb attack, the municipality of Ankara announced that they would change the name of the site to “democracy square” and will erect a monument named “democracy”. No one built a monument, for unknown reasons, but perhaps it is better than building a monument called “democracy” as it is hard to associate the word with a peace rally or a bomb attack. Later, when the families voiced their demand for a monument, referring to the promise from the municipality, they stated that they want the monument to have the names of the victims, and the word “peace”. Unfortunately, almost four years after the attack, the monument is still yet to be built.



Figure 25. The Site of the Attack. Accessed October 1, 2019. [https://upload.wikimedia.org/wikipedia/commons/7/78/Mourning_after_the_2015_Ankara_bombings_\(1\).jpg](https://upload.wikimedia.org/wikipedia/commons/7/78/Mourning_after_the_2015_Ankara_bombings_(1).jpg).

Families must have emphasised their wish for the names and the word “peace” to be a part of the monument because they wanted the monument to remind the attack explicitly. From the viewpoint of the government, the victims were dissi-

dents who should not be remembered as heroes, and this attack should not be remembered as a sign of the weakness of their power. Of course, this only an educated guess based on my knowledge of the context. However, it is the only theory I can use to explain why they irrelevantly suggested “democracy” for the renaming of the site and the monument to be built. Since its foundation in 2002, the leading members of the Justice and Development Party (the governing party, AKP) used “conservative democracy” term to define the identity of their party.⁶ During their rule since 2002, they frequently referred to themselves as the founder and the protector of democracy in Turkey. Therefore, since this term is a substantial part of their “branding”, possibly it was not an arbitrary choice by the municipality.

Naturally, I took the request of the families as a requirement for the artwork. The main elements of my monument were going to include names of the people who lost their lives, and the word “peace”. After a series of exploratory sketches, I focused on one of them and developed it further.

6 Doganay, Ülkü, “AKP’Nin demokrasi söylemi ve muhafazakarlık: muhafazakar demokrasi ve elestirel bir bakış” (Ankara Üniversitesi Siyasal Bilgiler Fakültesi Dergisi 2007), 67.

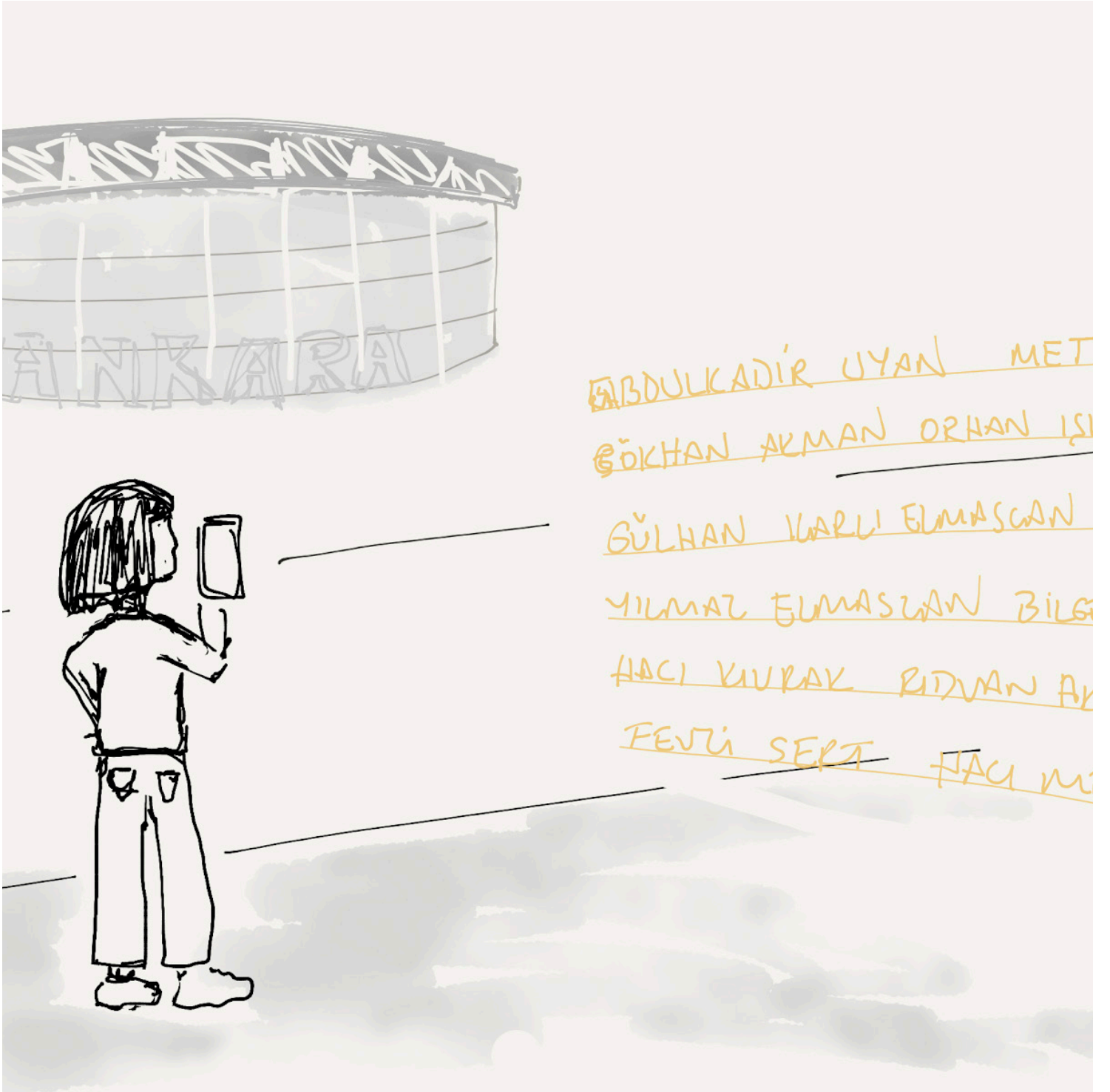


Figure 26. Early concept sketch 1.

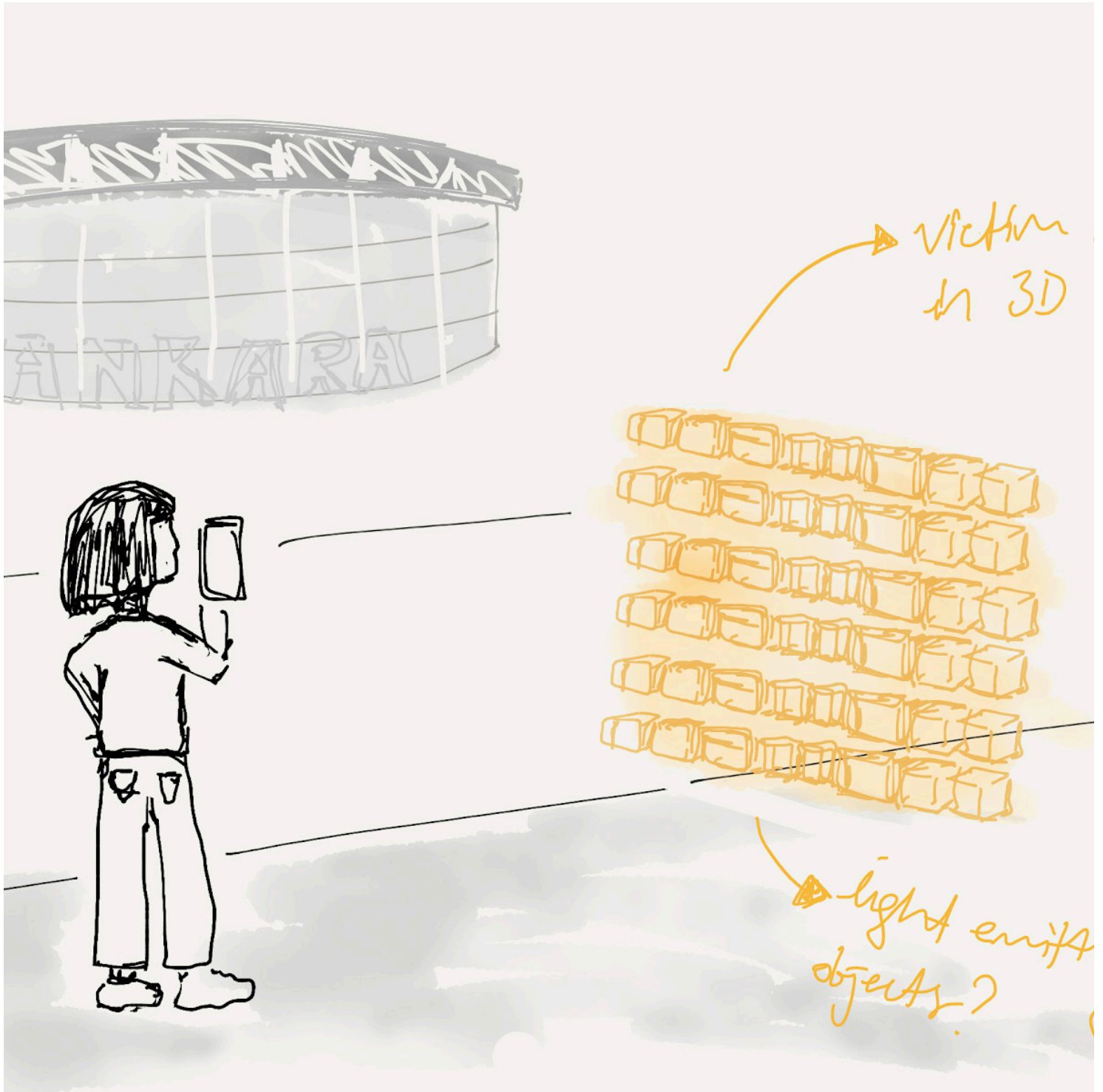


Figure 27. Early concept sketch 2.

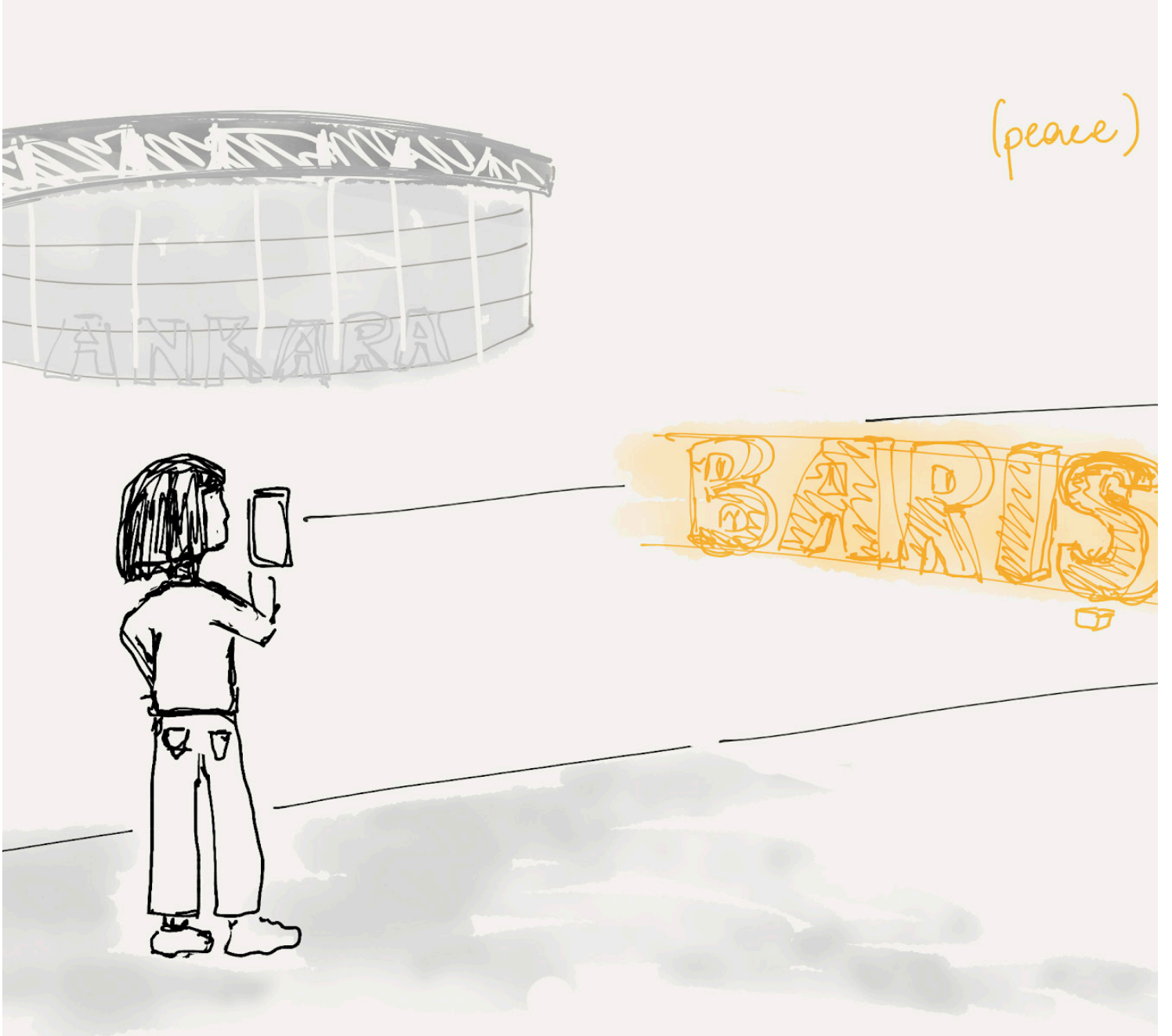


Figure 28. Early concept sketch 3.

When reading the news about the attack, what we see is a list of names on our screens, a block of text. Maybe some articles include the photos of the victims, a group of neatly tiled portraits. When I translated the list of names to spatial elements, it creates a different understanding of the number of people we lost. This was the first shocking revelation of the sketching phase. I also considered using the photos of the victims as an experiment, but soon enough, I noticed the challenges of this approach. First of all, I was able to find high resolution and well-taken images for some of the victims, for the majority of them, it was not possible to find images high (enough) resolution images. The existing temporary monument at the site has photos of the victims, but there were no photos for a couple of persons. Secondly, during my exploratory sketches, I gravitated towards a text-based form more and more. It reminded me of my graveyard visits, where I was not able to stop myself from reading the names on the headstones, trying to imagine owners of those names and their lives. Seeing only the names stimulates the mind to create a narration with very little information.

Another critical detail I should mention here is regarding the word “peace”. I decided to write it in multiple languages first to make sure the majority of the visitors understands it, and also to make a statement about the solidarity between the people of Turkey. Therefore, in the monument “peace” is written in Turkish, Kurdish (Kurmanji), Arabic, Greek, Armenian and English as these are the main languages spoken in the country.

In my digital sketches, I generated three-dimensional letters to create the feeling of a virtual, architectural entity. I also aimed for a design which highlights the virtuality of the installation. Therefore I tried to achieve a lightweight, dematerialised object through the choice of material. 3D letters are formed of asynchronously blinking light particles. In addition to successfully creating the lightweight feeling I was looking for, these light particles represent us, the masses, to me. They gather in the form of the names of those whom we lost, and the word “peace”. It illustrates the message I wanted to convey, we, the begone and remained, are the peace.



Figure 29. Digital sketch.

Creating the virtual monument and implementing the proof of concept application

I used Rhinoceros 3D software to create the 3D model of my virtual monument. I was already familiar with Rhinoceros 3D, but any 3D modelling software with FBX mesh exporting capability can be used. I structured the monument as a cylindrical form, comprised of the victim's names, which surrounds the participant. I wanted to create a monument which alters the way you see the world in every angle. The enclosed shape also creates a private space, a sanctuary of remembrance and mourning. And when the participant lifts their head to the sky, they will see "peace" in six languages, appearing one after another.

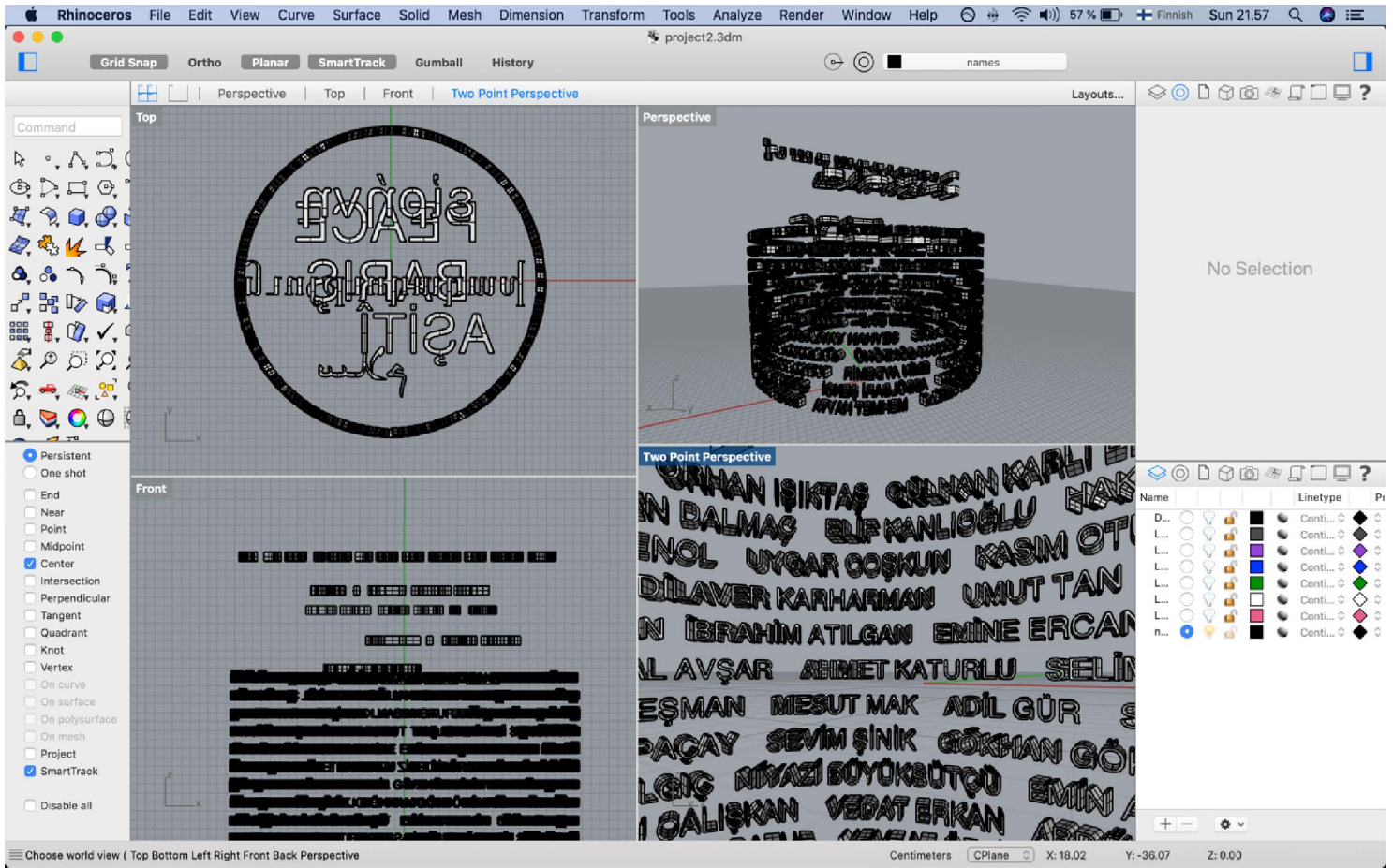


Figure 30. Screenshot from Rhinoceros 3D process.

I exported the 3d model of my virtual monument to Unity to create the material and the experience. Although Unity is a game engine, it is a sophisticated software and can be used to create not only games but also any three-dimensional or two-dimensional experience. It is widely used in many industries such as film, art and culture, simulation, engineering, architecture and construction. I also used Unity to build my experience as an iOS application using its handy AR Foundation plug-in. The smooth publishing workflow allowed me to try the experience on real devices (an iPhone and an iPad), since early on and frequently during my creation process. Easy publishing also makes creating a proof of concept application possible with little iOS development knowledge.

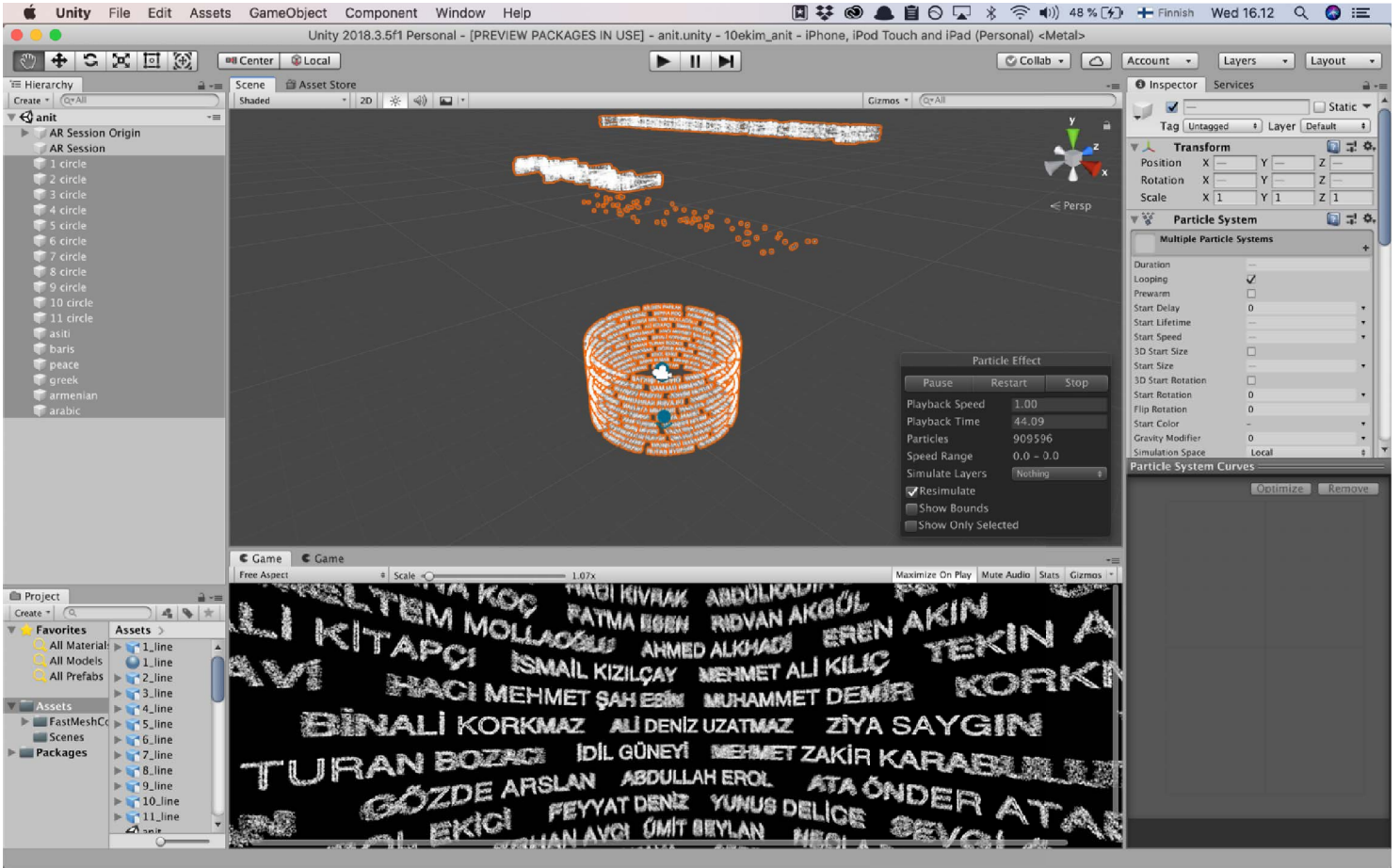


Figure 31. Screenshot from Unity process.

When I started my work on Unity, the iOS publication plugin was “AR Kit Plugin”. While I was at the halfway to finishing the project, Unity announced killing the plugin and introduced AR Foundation as a replacement. Even though this change made a negative impact on my schedule, AR Foundation plugin is generally a better solution compared to ARKit plugin since it supports both Android and iOS platforms.

When it comes to implementing a dedicated application, I had two paths to choose between: collaborating with someone who has the skills to develop an application or learning how to do it and build it myself. The first option, collaborating with someone, would leave me more time to conduct more in-depth research for the artwork. For example, maybe I would create multiple artworks throughout the city, or I could work more on the design of the application experience, or maybe I could even turn it into a releasable product (Although, building

an end-user ready software is a big project and requires a different approach and planning the proof-of-concept setup). There is, on the other hand, several challenges regarding this option. The first one is finding that person who would like to put their valuable time into a research project without being paid and shares my values so that we can work in harmony without making big compromises. Secondly, this person would need to support me and the tool for maintenance and ad-hoc needs even after building the application. Another reason which drove me away from the path is that I wanted to gain a deeper understanding of the AR technology and get to know my medium closer. I value this kind of insider knowledge and the experience of crafting your work.

Nevertheless, building it alone, without any prior knowledge, has its challenges. It is time-consuming if there is no proper guidance, and can be frustrating at times. However, this production process has become one of the biggest learnings I gained from this research.

I chose to build the proof of concept application for the iOS platform, and as I mentioned earlier, Unity provides a plugin which makes this process quite accessible. After building the Unity experience as an iOS application, I picked up Xcode (Apple's integrated development environment) to add the location-based capability to my application. Apple's iOS SDK (software development kit) has a framework for this purpose, called Core Location (<https://developer.apple.com/documentation/corelocation>). I experimented with Core Location, and I was not able to achieve the results I was aiming for. The site I wanted my virtual monument to appear is a traffic island, and its width is around 6meters while the length is about 12meters. Theoretically, GPS systems on our phones are precise and accurate enough to allow me to place my virtual monument on the traffic island. However, in practice, the tests I conducted for a similarly sized area, and the literature research revealed that achieving a reliable location accuracy is not very easy. Location accuracy depends on some parameters like network reception performance, WiFi and Bluetooth activation, the device hardware and buildings in the area. Therefore, maintaining a reliable accuracy throughout the experience, across different devices is a complicated task. If the creator is planning to

place the artwork randomly on a position in a wide area, such as a public square, this is relatively easier. However, for smaller sites, a more sophisticated development would be required. For this reason, I deactivated the location capability for the focus group tests.

4.5 Focus group test and field observation

To conclude my practice part of my practice-led research, I conducted a qualitative study at the site, with a volunteer focus group. My main goals for the study were:

- **To observe participants' experiences and receiving feedback from them:** To understand if the participants' experiences and the emotions my artwork evoked were in-line with my objectives and principles, I observed my participants experiencing the artwork and listened to their feedback. Also, to hear their thoughts about my research question, we held a group discussion about my research and the context.
- **To observe usability and the feasibility of the scenario:** Besides the monument experience, I wanted to observe the use of the app and the hand-held device.
- **Observing the surroundings (passerby reactions):** Onsite observation gives clues about the radiant effects of the experience. Although Turkish culture is communicative and people react to unusual events in public space, I would argue that in Ankara, a big metropolitan, social interactions in the public space is not very common. Especially the sensitive nature of my site is not inviting for spontaneous social banter. I wanted to observe the influence of the surroundings on my test group and vice versa.
- **Trying the experience myself at the site:** Although I visited the site during my previous trips to Ankara and made observations and took photos, I designed the monument and built the application in Finland. There-

fore, I needed to experience it at the site where I designed it for and compare this experience to what I wanted to achieve.

I created a call for volunteer participation text to invite test users, spread this to my contacts, asked them to share it to their friends, and I posted it on Facebook. I included the name and the theme of the artwork to make the first-encounter as close as it can be to the concept design. If the users download the app as the design envisions, they will have an idea about the artwork due to the location and a brief project description. I also wanted to be transparent enough due to the sensitive topic of the artwork. Then I chose my group based on these two criteria: Living in Ankara at the time of the attack and has kept living there to the date.

Participants and the test

Six participants tested the experience. Their ages change between 25-34. For privacy reason, I will refer them as Participant 1...6. Four of the participants fit the early adopter persona, while two of them fit the secondary persona.

We conducted two sessions since I wanted to observe both the daytime and nighttime experiences. I scheduled one participant for the nighttime session; the first session was in the afternoon with five participants. I distributed the participant group unevenly to the sessions because I wanted to conduct a group discussion with the highest possible number of participants. Each participant experienced the monument individually. During the experience, I asked participants to express their thoughts out loud and give direct feedback when they want to. I took notes of their feedback and my observations. Also recorded their videos and the screen of the iPad they were using.

Focus group discussion

Following the first test session, the five participants and I gathered to have a focus group discussion. I followed a semi-structured interview method. I asked a few open-ended questions and let the conversation flow organically. As the discussion proceeded, I revised my questions and added new ones. The discussion

lasted for approximately 90 minutes, and I documented by taking notes. I preferred taking notes both during the experience and the focus group discussion for two main reasons: First of all, since five of the six participants personally know me, they would have had a difficult time to refuse my request even if they would be uncomfortable with being recorded. I wanted to provide a safe discussion environment for everyone. Secondly, I did not see value in taking voice recordings for this context.

Site of the Study

We conducted the test at the site I chose for the monument, which is the site of the attack. Although the attack site can be considered the whole road area in front of the Train Station, I defined the traffic island--where the temporary monument is located, and families hold regular monthly gatherings--as the zone for my monument.

Ethical and other issues

The participants share similar world views, backgrounds and their ages only vary between 25-34. Therefore my learnings are limited to a particular group. Although I assume that this group represents the early and the secondary adopters, keeping the age group broader could have provided me with more information. However, the difficulties of reaching out to a wider audience due to limited time and the test set up were greater than my estimation.

I tried not to disturb the natural flow of daily life at the site. If I visited the site more often, I think I would draw attention from the security officers, and I did not want to put myself into a risky situation as the creator of the artwork. It is difficult to foresee how police would react if bigger groups of people visit the site for the artwork.

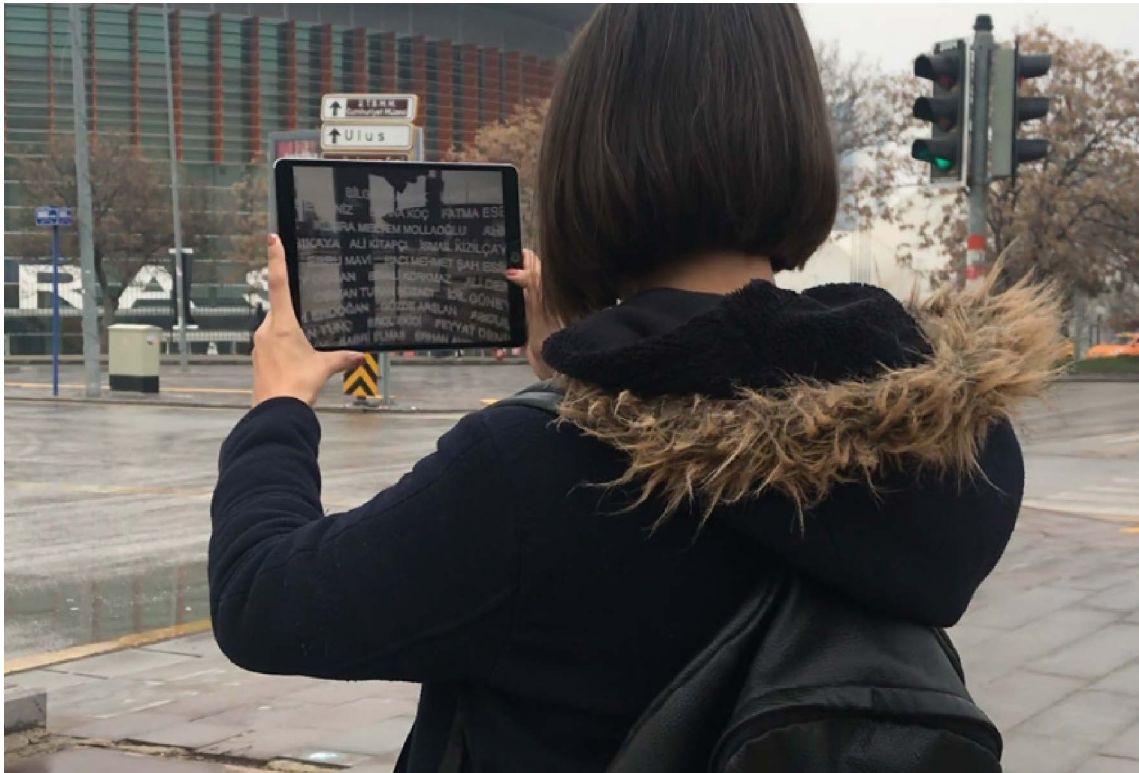


Figure 32. Participant observation.



Figure 33. Still image from participant's screen recording showing victim names.



Figure 34. Still image from participant's screen recording showing overhead "peace" text.

Findings

In this section, I want to present the key findings with references to participant tests, focus group discussion and the field observation.

During the experience and focus group discussion, all of the participants defined the experience as a blend of grief, remembrance, and resistance. They expressed their appreciation for the opportunity to reconnect with their sorrow and the memory of the victims. Participant 2 said:

This monument makes me think about how we avoided grieving for our loss after the attack. The government's continuous propaganda for stigmatising the victims and everyone who showed up at the rally made us prioritise defending ourselves. Also, there is the leftist tradition of being resilient no matter what. You can not be upset or afraid, and the fight is going on, and so on.

Participants also stated that the government's unwritten prohibition of commemorating this attack has been partly effective. Participant 1, Participant 2 and Participant 4 noted that they did not remember the year of the attack, or the number of the victims at first, when they saw my call for participation. Participant 2 commented: "They want us to forget, so we forget, and that is horrible". In the focus group discussion, they all agreed that in Ankara, public commemoration of the attack is considered insurgency. Participant 3 said: "When people gather to remember this attack, police immediately disperses the group. There is also a risk of being detained by the police".

The five of the participants, who joined the focus group discussion, expressed that they were glad for having a conversation about the attack. Participant 5 said:

This is not only about the monument. People are afraid of talking about this. We lost a classmate at the attack, and our university did not permit us to hold a commemoration at the school. This kind of overreaction and

stigma that comes from the authorities harms our social life. The people who do not know so much about the issue feel suspicious of us, and they isolate us. We restrain ourselves from expressing our opinions, even to our classmates.

Other participants mentioned that even in their closer, like-minded social groups avoid talking about the attack. Participant 3 thinks that people do not talk about the attack because they do not know how to respond to the unexpected wave of hatred came after the attack. The participant further explained:

The government's and the society's attitude towards the victims has deepened the polarisation. We see that half of the country do not have the motivation to live with people who are not like them. They do not share our pain. I guess this was too difficult to process and talk about for most of us.

They all agreed that the AR monument experiences reminded them of the times when they were more hopeful. Participant 1 said, "Maybe the experience did not empower me, but it certainly reminded me of the healing power of conversation".

During the experience, participants expressed a wide range of emotions. They mentioned that they were happy about being there and remembering them. Participant 6 said, "I am coming here for the first time after the attack, and I am feeling a strange relief". Participant 3 said "Experiencing this monument here is giving me goosebumps. I know that we could have viewed this anywhere, but I do not think it would have affected me this much in a different location." They all expressed being sad about remembering the day of the attack. All of them showed positive reactions to the overhead "Peace" part, and the use of different languages. Participant 1 added said, "my initial happiness faded into sorrow because I know that today, more than three years after the attack, we have less hope for peace than the day of the attack". The form of the monument evoked different associations for the participants. For example, Participant 2 told that looking at the names reminded them searching for their family friend's name on the list of the names at the hospital, on the day of the attack. Two of the participants, Par-

ticipant 1 and Participant 4, made a different comment about the form. They expressed that seeing the names in the form of the monument made them perceive the number of victims differently. When Participant 1 started the experience, their first reaction was “too many people”.

Four of the six participants were wary of possible police intervention. When we met up at the train station, they suggested experience the monument one by one, stating that the police comes to check if a group larger than three people gathers at the site. I waited at the site and observed each participant one by one. Two passersby interacted with us, I explained that we were testing a project but did not give information about the content. Only Participant 4 expressed his concerns about interacting with strangers about this experience.

Five of the six participants ran into bugs and glitches during their experience. All of them expressed that a fixed, polished and smooth experience would have improved their engagement. Participant 5 said: “I did not think of the monument as an AR application until it started stuttering, and some names started to collide into each other. I hope you fix these issues. They interrupt the experience”.

The use of the device and the ergonomics of the space were as expected. Hand-held devices give enough peripheral awareness to the user to be mindful about their surroundings. The participants did not bump into anyone or stepped out of the traffic island. However, if the artist does not give any directions or warnings to the participants, some people may try to cross the road looking at their screen. The artist should consider the safety and the specifications of the site when creating the experience.

CHAPTER 5

Conclusion

This research started from an individual desire to make art to resist and intervene, and transformed into a quest to study augmented reality technology as a public art tool. This transformation was possible because we, humans, can develop ideas from our experiences. Furthermore, we can synthesise these ideas with the ideas of others. When I zoom out to look at my process, I see the seed of an idea growing, branching out and intertwining with many different ideas. In this chapter, I present a synthesis of my learnings from the research process.

5.1 So, how can we harness augmented reality technology as a public art tool to intervene with power relationships in the public space of our network society?

As I explained in the second chapter, I stand with Manuel Castells's theory about the role of digital technologies in power relationships. The emergence of networked systems already intervened with the power of authority over our culture, economy and politics by providing the masses with a new way of communication—mass self-communication. Networked AR experiences can expand this capacity of networked systems with their ability to merge our communication space and physical space. My research shows that one of the most significant

potentials of AR as a public art tool lies in the ability of remote access to places. The virtual networked communication tools allowed us to voice our opinions in the virtual communication space; AR brings that ability to our physical spaces. AR promises more than being an open virtual layer on our surroundings; it can potentially bring the diversity of our online networks to our places. During the focus group discussion, Participant 5 said: “I do not think you would have made this artwork if you were still living in Turkey. You would lose your ambition, hope and maybe you would be afraid”. It is hard, if not impossible, to know whether the participant’s speculative scenario of an alternative past is correct or not. Still, it does not sound impossible. Our perceptions and opinions continuously change, and my artwork certainly has traces of my experience living in Finland. The ability to take our perspectives and ideas to faraway places, meet them with people at that place, opens the door to many possibilities. Besides, we can do this only with our computers and an internet connection. When I talk about the potentials of AR, I do not intend to take a techno-optimistic approach. As a critical new media researcher and designer, I feel the responsibility for considering any emerging technology to be both an opportunity and a threat. That is the particular peculiarity of this section of time; almost everything we create can become both an opportunity and a threat. Therefore, I want to embrace the potential of AR while being cautious at the same time.

The second significant potential of AR, as a public art tool, my research demonstrates is its capability as a social communication tool in the public space. AR experiences generate conversations about a societal issue, right at the site. During the focus group tests, I observed the participant responses, their body language, and their discussions after the experience. An artist’s, temporary or permanent, intervention at a place can initiate discussion or an implicit communication between the community, and this can be fundamentally empowering in communities where the authority strictly restricts the discussions about particular issues. Furthermore, it also opens a new communication channel for artists who desire to work with public space. Especially in spaces where the authority restricts the expression of different ideas, networked AR public art applications can enable artists to communicate themselves and avoid the threat of power.

I argue that AR public art experiences that leverage the two aspects I identified above can provide engaging experiences for the participants, and can generate power for the artists and communities. I must add that most possibly soon we will discover new potentials of this technology, for public art and other contexts. As I explained in Chapter Two, AR is a rapidly evolving field, and the new advances may render some of the parts of this research obsolete. However, I hope that my research will prove useful to other artists, researchers and designers in some way. Therefore, in addition to the insights I presented above, I want to give recommendations to other practitioners.

Especially an artist who creates a long-distance artwork should ensure that they have a good understanding of the site's context. If necessary, learning about the culture and daily life is the obvious first step to take. Apart from the study of the general cultural context and daily life, the artist should stay updated with the recent situation at the site. For instance, my focus group test helped me get information about the practices of police at the site. However, if I did not visit the site, I would have needed to learn the details about the site from a local person. The artist should also consider the technological capacity of their audience. If they create an artwork which is not supported by the majority of their audience's devices, the experience will not reach to people. Finally, the artist should consider the ways of hearing back from their audience. If possible, the artist can observe their audience and talk to them. Online communication platforms can be useful if the artist is away from the site or if anonymity is a concern.

5.2 Further work

I desire to implement my artwork as a long-lasting, finalised experience and create artworks for other sites as well. The first step forward is to iterate the Virtual Monument for 10 October 2015 Bomb Attack Victims based on the learnings from the proof of concept and focus group tests. Besides fixing the issues and improving the production quality, I want to incorporate interactivity to my artwork per feedback from the test participants, and others have seen it. Since I improved my production skills during the creation of the first version of my work, I feel confi-

dent about taking it further and leveraging the full power of my production tools. Secondly, I want to collaborate with a software developer to create a stable and robust application. As I explained in Chapter Four, the technology is not mature enough to achieve all kinds of experiences decently. For example, if the location accuracy will not enable me to plant my artwork in a small area reliably, I may need to change my artwork following the technical limitations.

I wish to see Snapchat Lens Studio or Facebook Spark AR introduce new features to their products, especially locativity. Perhaps there will be other platforms with this capability. If we witness this, I believe that the societal accept of AR will accelerate, and the artists can reach to a wider audience. I hope to be among the ones who create interventions using such platforms.

5.3 Open questions, speculations, possibilities

Working with AR is exciting and challenging at the same time since this medium does not have established conventions yet. We, the creators, developers, and users are exploring the potential this technology holds and shaping the future of it as we experiment with it. As much as we get excited about AR, we also contemplate the nightmare scenarios. If, in the future, our reality will be continuously mediated by computers, if our daily lives will depend upon a globally connected virtual layer, how will this shape us and our perception of reality? How open and free will this space be? Will gigantic corporations become the major publishers of this space, will we become siloed based on our reality provider? I do not know the answers. I do not think anybody does. But I do know that technology changes the society at an unprecedented speed, and leaves us oscillating between hope and fear. However, hope or fear alone do not help much. We can tell that by looking at holders of power. Our governments, economies, industries and institutions seem very afraid of losing their relevance in the fast-changing texture of our society. They either try to force their archaic tools to hinder the change or nervously try to adopt the new tools and mould them into their desired shapes. I propose that we, the oppressed, use and shape our technologies the way we want them to shape us back. We must be the early creators, researchers, decision-makers in the

development of emerging technologies and take advantage of them. I hope to see many creators working with AR to disturb the structures of power. By the way, I wonder, who or what would you want to disturb using AR?

Bibliography

4Gentlemen. "Diary in Exile," January 31, 2011. https://fourgentlemen.blogspot.com/2011_01_01_archive.html.

Azuma, Ronald T. "A Survey of Augmented Reality." *Presence: Teleoperators and Virtual Environments* 6, no. 4 (1997): 355–85. <https://doi.org/10.1162/pres.1997.6.4.355>.

"Bringing Mixed Reality to the Web." *The Mozilla Blog*, October 20, 2017. <https://blog.mozilla.org/blog/2017/10/20/bringing-mixed-reality-web/>.

Carrol, John M. "Five Reasons for Scenario-Based Design," *Proceedings of the 32nd Annual Hawaii International Conference on Systems Sciences*. 1999. HICSS-32. Abstracts and CD-ROM of Full Papers, n.d., <https://doi.org/10.1109/hicss.1999.772890>.

Castells, Manuel. "Communication, Power and Counter-Power in the Network Society." *International Journal of Communication* 1 (2007): 238–66. <https://doi.org/10.1080/1932-8036.2007.0238>.

Certeau, Michel de. *The Practice of Everyday Life*. Berkeley: University of California Press, 1984.

Cooper, Alan. *The Inmates Are Running the Asylum*. Indianapolis, IN: Sams, 2004.

"Digital Art in Game Design " VR History – Ivan Sutherland and the Sword of Damocles." *Digital Art in Game Design*. Accessed October 1, 2019. <http://students.expression.edu/thatoneblog/2016/08/09/vr-history-ivan-sutherland-and-the-sword-of-damocles/>.

Doganay, Ülkü, "AKP’Nin demokrasi söylemi ve muhafazakarlık: muhafazakar demokrasi ve eleştirel bir bakış" *Ankara Üniversitesi Siyasal Bilgiler Fakültesi Dergisi*, 2007.

Etherington, Darrell. "Google Launches 'Live View' AR Walking Directions for Google Maps." *TechCrunch*. TechCrunch, August 8, 2019. <https://techcrunch.com/2019/08/08/google-launches-live-view-ar-walking-directions-for-goo->

gle-maps/.

Fosdick, Howard. "The Sociology of Technology Adaptation." *Enterprise Systems Journal*, 1992. [http://www.rexxinfo.org/Sociology of Technology Adoption/SOCIOL_1.HTM](http://www.rexxinfo.org/Sociology%20of%20Technology%20Adoption/SOCIOL_1.HTM).

Garcia, David, and Geert Lovink. "The ABC of Tactical Media." *Nettime*, May 16, 1997. <https://www.nettime.org/Lists-Archives/nettime-l-9705/msg00096.html>.

Gartner Hype Cycle. Gartner. Accessed October 2, 2019. <https://www.gartner.com/en/research/methodologies/gartner-hype-cycle>.

Geroimenko, Vladimir. *Augmented Reality Art from an Emerging Technology to a Novel Creative Medium*. Cham, Switzerland: Springer, 2014.

Inbar, Ori. "ARKit and ARCore Will Not Usher Massive Adoption of Mobile AR." *Medium*. Super Ventures Blog, January 19, 2018. <https://medium.com/super-ventures-blog/arkit-and-arcore-will-not-usher-massive-adoption-of-mobile-ar-da3d87f7e5ad>.

Kwon, Miwon. *One Place after Another: Site-Specific Art and Locational Identity*. Cambridge, MA: MIT Press, 2004.

Lacy, Suzanne. *Mapping the Terrain: New Genre Public Art*. Seattle, Wash: Bay Press, 1996.

Lacy, Suzanne. "Works." SUZANNE LACY. Accessed October 2, 2019. <http://www.suzannelacy.com/early-works#/three-weeks-in-may/>.

Lefebvre, Henri. *The Production of Space*. Translated by Donald Nicholson-Smith. Malden: Blackwell Publishers Ltd, 1991.

"Manifest.AR Artist Group AR Art Manifesto." *Manifest.AR Artist Group AR Art Manifesto*. Accessed October 1, 2019. <http://manifest-ar.art/>.

Matsuda, Keiichi. "Hyper Reality". Accessed October 1, 2019. <http://hyper-reality.co/>.

Milgram, Paul, Haruo Takemura, Akira Utsumi, and Fumio Kishino. "Augmented Reality: a Class of Displays on the Reality-Virtuality

"Mixed Reality & VR." Mozilla Research. Accessed October 1, 2019. <https://research.mozilla.org/mixed-reality/>. Continuum." Telemanipulator and Telepresence Technologies, 1995. <https://doi.org/10.1117/12.197321>.

Nafarrete, Jonathan. "Snapchat and Instagram Continue AR Filter Battle." VRScout, May 16, 2017. <https://vrscout.com/news/snapchat-instagram-ar-filter-battle/>.

Russell, Jon. Accessed October 1, 2019. <https://techcrunch.com/2018/02/08/chinese-police-are-getting-smart-glasses/>.

Sutherland, Ivan E. "A Head-Mounted Three Dimensional Display." Proceedings of the December 9-11, 1968, Fall Joint Computer Conference, Part I on - AFIPS 68 (Fall, Part I), 1968. <https://doi.org/10.1145/1476589.1476686>.

Sutherland, Ivan. "The Ultimate Display." Proceedings of IFIP Congress, 1965, 506-8. [http://worrydream.com/refs/Sutherland - The Ultimate Display.pdf](http://worrydream.com/refs/Sutherland%20-%20The%20Ultimate%20Display.pdf).

Steinert M. and Leifer L., "Scrutinizing Gartner's hype cycle approach," Picmet 2010 Technology Management For Global Economic Growth, Phuket, 2010, pp. 1-13

Tufekci, Zeynep. Twitter and Tear Gas: the Power and Fragility of Networked Protest. Place of publication not identified: YALE University Press, 2017.

Wodiczko, Krzysztof. "Projections." Krzysztof Wodiczko. Accessed October 2, 2019. <https://www.krzysztofwodiczko.com/public-projections#/south-africa-house-projection/>.

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